iQ Console System

Installation & User's Guide

Manual Rev 1.2 — March, 2012
for iQ v1.00 and higher

p/n 1490-00067-001

USA Class A Computing Device Information To User. Warning:

This equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used as directed by this manual, it may cause interference to radio communication. This equipment complies with the limits for a Class A computing device, as specified by FCC Rules, Part 15, Subpart J, which are designed to provide reasonable protection against such interference when this type of equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. If it does, the user will be required to eliminate the interference at the user's expense.

NOTE: Objectionable interference to TV or radio reception can occur if other devices are connected to this device without the use of shielded interconnect cables. FCC rules require the use of only shielded cables.

Canada Warning:

"This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the Radio Interference Regulations of the Canadian Department of Communications." "Le present appareil numeriQue n'emet pas de bruits radioelectriQues depassant les limites applicables aux appareils numeriQues (de les Class A) prescrites dans le Reglement sur le brouillage radioelectriQue edicte par le ministere des Communications du Canada."

CE Conformance Information:

This device complies with the requirements of the EEC Council Directives: 93/68/EEC (CE Marking); 73/23/EEC (Safety – low voltage directive); 89/336/EEC (electromagnetic compatibility). Conformity is declared to those standards: EN50081-1, EN50082-1.

Important Safety Information

To prevent risk of electric shock: Disconnect power cord before servicing. If fuse replacement is required, please note: For continued protection against fire, replace fuse only with same type and value.

Caution

The installation and servicing instructions in the manual are for use by qualified personnel only. To avoid Electric Shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified personnel.

Electrical Warning

To reduce the risk of electrical shock, do not expose this product to rain or moisture. Keep liquids away from the ventilation openings in the top and rear of the unit. Do not shower or bathe with the unit.

This equipment is designed to be operated from a power source that includes a third "grounding" connection in addition to the power leads. Do not defeat this safety feature. In addition to creating a potentially hazardous situation, defeating this safety ground will prevent the internal line noise filter from functioning.

Ventilation Warning

The Axia QOR.32 requires the free flow of air for adequate cooling. Do not block the ventilation openings in the top and rear of the unit. QOR.32 must be mounted with a blank rack space above or damage may occur.

Failure to allow proper ventilation could damage the unit or create a fire hazard. Do not place the units on a carpet, bedding, or other materials that could interfere with any panel ventilation openings.

Customer Service

We support you...

By Phone/Fax.

- You may reach our 24/7 Support Team anytime around the clock by calling +1 216-622-0247. For billing questions or other non-emergency technical questions, call +1 216-241-7225 between 9:30 AM to 6:00 PM USA Eastern Time, Monday through Friday.

By E-Mail.

- Non-emergency technical support is available at **Support@AxiaAudio.com**.

Via World Wide Web.

- The Axia Web site has a variety of information which may be useful for product selection and support. The URL is **http://www.AxiaAudio.com**.

Feedback

We welcome feedback on any aspect of the Livewire products or this manual. In the past, many good ideas from users have made their way into software revisions or new products. Please contact us with your comments.

Updates

The operations of iQ and QOR.32 are determined largely by software. Periodic updates may become available - to determine if this is the case, visit our web site periodically, or contact us for advice concerning whether a newer release is more suitable to your needs.

We recommend joining the Axia Tech mailing list to ensure that you receive immediate updates regarding new software or documentation releases. You can do so by clicking the "Sign Up Here" links at the top of the Axia Download and Manuals pages at AxiaAudio.com/manuals/ and AxiaAudio.com/downloads/.

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Axia Audio
1241 Superior Ave. Cleveland, OH 44114 USA
+1 (216) 241-7225
Inquiry@AxiaAudio.com

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Warranty

This product is covered by a five year limited warranty, the full text of which is included in the rear section of this manual.

Service

You must contact Axia before returning any equipment for factory service. Axia will issue a Return Authorization number, which must be written on the exterior of your shipping container. Please do not include cables or accessories unless specifically requested by the Technical Support Engineer at Axia. Be sure to adequately insure your shipment for its replacement value. Packages without proper authorization may be refused. US customers please contact Axia technical support at +1 (216) 241-7225. All other customers should contact their local representative to arrange for service.

We strongly recommend being near the unit when you call, so our Support Engineers can verify information about your configuration and the conditions under which the problem occurs. If the unit must return to Axia, we will need your serial number, located on the rear panel.

Credit Where Credit's Due

Thanks to the great folks on the Axia team who produced a great product and helped to compile this manual - Catfish, Denny, Gints, Maciej, Marc, Maris, Marty, Milos, Oleg — we are honored to work with all of you. *cn and bw.*

Feedback is welcome

At Axia, we love to hear your feedback. If you find anything in this manual that you feel needs clarification or correction, please let us know by sending an e-mail to cnovak@AxiaAudio.com .

About This Manual

This manual covers the details of the iQ Frames and QOR.32. Axia's iQ is designed to operate as a standalone console however it also has network capabilities. To learn more about these concepts, you may wish to read ***Introduction to Livewire: System Design Reference and Primer*** and ***Audio Over IP: Building Pro AoIP Systems with Livewire*** by Steve Church and Skip Pizzi, available from Elsevier Press.

In these publications we explain the ideas that motivated Livewire and how you can use and benefit from it, as well as nitty-gritty details about wiring, connectors, and the like. Since Livewire is built on standard networks, we also help you to understand general network engineering so that you have the full background for Livewire's fundamentals. After reading this reference material, you will know what's up when you are speaking with the network guys that are often hanging around radio stations these days.

Although we strive for accuracy, some features and operational characteristics may differ in actual use from their descriptions herein. We invite feedback and corrections from our clients.

Axia Audio, a Telos Company
1241 Superior Avenue
Cleveland Ohio 44114 USA
Phone: +1.216.241.7225
Web: **www.AxiaAudio.com**
E-Mail: **Inquiry@AxiaAudio.com**

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Table of Contents

Customer Service iii
Warranty iv
Service iv
Credit Where Credit's Due iv
About This Manual iv
A Note From The CEO of Telos vii

Getting Started 1

Chapter One: Setup And Connections 3
Introduction 3
The Basics 3
Assigning an IP Address. 3
Notes on Physical Installation 3
QOR.32: Front Panel 4
Front Panel Indicators 4
QOR.32: Rear Panel 5
Power 5
Audio Connections 6
GPIO Connections 7
Ethernet Connections. 7
iQ Frame and CANBus Connections 7
IP Address Configuration. 8
Console Configuration 9

Chapter Two: Inputs and Outputs 11
Inputs 11
What's a Profile? 12
Show Profiles 12
Source Profiles 12
Source Configuration 12
Creating a New Source 13
Source Type 13
Source Input 14
Primary Source 14
Signal Mode (Non-Microphone Sources) 14
Signal Phase (Non-Microphone Sources) 14
Record Mode 14
Fader Trim Gain. 14
Equalizer 14
Panorama Position 15
Source Availability 15
Fader Mode 15
Preview Mode 15
Preview Switching 15
Auto-Start Timer 15
Logic Port 16
Feed to Source 16
Feed to Source Dim Gain 16
Live Controls 17
iQ Outputs 17
V-Mixer and V-Mode 18
Adding Backfeeds and GPIO 19

Chapter Three: Console Operation. 21
Overview 21
Displays 21
Show Profiles 21
Sources, Channels and Faders 21
Mix-Minus 21
GPIO 22
Software 22
iQ Main Frame - Callouts and Operation 22
System Settings 27
iQ 8-Fader Expansion Frame 27
iQ 6-Fader+Telco Expansion Frame 27
iQ 6-Fader+User Keys Expansion Frame 29
Source-Specific Channel Controls. 29
Control Room Operator Mic Channel 29
Producer Microphone Channel 29
Control Room Guest Microphone Channel . . . 29
Studio Microphone Channel 30
External Microphone Channel 30
Phone Channel 30
Codec Channel 30
Remote Control 31

Chapter Four: Show Profiles 33
Creating A Show Profile 33
Show Profile Options 34

Chapter Five: Configuring GPIO 39
GPIO Port Definitions 39
GPIO Operator's Microphone Logic 40
GPIO Control Room Guest Microphone Logic . . 41
GPIO Studio (Monitor 2) Guest Microphone Logic 42
GPIO Producer's Microphone Logic 43
GPIO Line Input Logic 44

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GPIO Codec Logic 45
GPIO Telephone Hybrid Logic 46
GPIO Control Room Monitor Logic 47
GPIO Studio Monitor Logic 48
GPIO Computer Playback Device Logic 49
GPIO Film Legendable User Button Module / Accessory Panel / Rack Panel 50
GPIO Recording Device Logic 51
Assigning GPIO to a Source 52
Connections to GPIO Ports 53
Input Connections 53
Output Connections 54
Virtual GPIO 54
Configuring and using iQ User Keys 55

Chapter Six: Advanced Controls 57
iQ Configuration Screens 57
The iQ Control Center 57
The Status Screen 57
The Setup Menu 57
The Customize Menu 58
Log, Log History and Log Setup Menus 59
Brightness Control Menu 60
User Modules Menu 60
GPIO Configuration Menu 60
Remote. 60
Profile Manager Menu 61
IO Manager Menu. 61
Ethernet Switch settings (Preconfigured) 61

Chapter Seven: Networking with iQ 63
Inputs 63
Outputs 64
GPIO. 65
Networking 65

Appendix A: iQ Specifications 67
Table of Inputs and Outputs 68

Appendix B: iQ Block Diagrams 73

Appendix C: Channel / IP Worksheets 81

Warranty 85

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A Note From The CEO of Telos

In 2003, Telos launched the Axia Audio division based on an idea. That idea sparked a whole new approach to radio consoles, using Ethernet as a high-speed expressway – the routing infrastructure for audio and data inside the radio station.

Howard Aiken, the scientist responsible for the conceptual design of IBM's groundbreaking Harvard Mark I computer, once advised "Don't worry about people stealing your ideas. If your ideas are any good, you'll have to ram them down people's throats." Sure enough, during our first few years, the idea of using Ethernet to transport audio was so novel that we spent most of our time simply telling people our story, sleeping in hotel beds – and bringing home very few sales.

After what seemed like an endless stream of hotel desks and airline food the idea took hold, thanks to forward-thinking engineers who understood the power of using data networks for audio transmission. Our first installations proved that the technology was real. Then those engineers began sharing stories of their own, telling other folks how much they loved what Axia did for them. Word got around, and we sold thousands of consoles (enough that Element consoles are now one of the best-selling broadcast boards ever).

As more and more broadcasters embraced IP, dozens of companies partnered with us to make innovative broadcast products that connect to Axia networks with just the click of an Ethernet cable. And we conceived of some interesting new devices and applications to help broadcasters take full advantage of their networked environment.

For example, we introduced broadcast VoIP telephone systems that integrate with consoles, merging telephony into the studio network without adding infrastructure (and giving broadcasters the world's first consoles with integrated Telos hybrids). Intercom systems that connect via Ethernet, and permit users to take broadcast-quality intercom calls to air instantly. Networked codecs and audio processors like the Telos Zephyr iPort and Omnia.8X, which concentrate multiple audio devices into a single network node, significantly changing the economics of complex systems.

And along the way, we expanded our talented staff of engineers, scientists and broadcast professionals, growing the largest R&D organization in the industry. We're also the first and only broadcast equipment maker with a 24/7 support team that's ready to offer assistance any time of the day or night. As they say, radio never sleeps – so neither do we.

We realize that it's not due to our efforts alone that these things have happened — it's due to yours. We owe quite a lot to you, and we will never, ever forget it. You are, literally, the reason we are here! And we will continue to innovate, explore, think and invent, for one simple reason: we love to hear you say "Wow!"

Michael "Catfish" Dosch

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CAT.6, small and light

yet sound and data pour forth.

What magic is this?.

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Getting Started

The following chapters of this manual will give you an in-depth understanding of the capabilities of your new iQ fader frames and QOR.32, from installation to advanced functions. This section will help you get everything connected quickly, and point you to the parts of the manual you'll need to get up and running with a minimum of fuss.

The Axia iQ family consists of these components:

- **iQ Main Frame:** 8-fader frame with master controls and meters.
- **iQ 8-Fader Frame:** 8-fader expansion frame
- **iQ 6-Fader+User Keys:** Optional expansion frame includes 6 faders and two banks of programmable user keys.
- **iQ 6-Fader+Telco:** Optional expansion frame includes 6 faders and a Telos-style dual channel hybrid controller.
- **QOR.32:** Rack-mounted CPU chassis with audio I/O and GPIO connectors.
- **QOR Backup Power Supply:** Optional rack-mounted backup power supply.

Making Connections

You've probably unpacked your boxes and are sitting next to a pile of Axia gear, wondering what to do first. Here's what you need to know in order to get started:

1. Packed with each of your iQ Frames is a cable with 6-pin Molex™ connectors on each end. This is the power/communications cable. Connect the end of the cable without the strain relief to the corresponding port on the iQ Frame connection panel. Connect the other end of the cable to one of the connectors labeled CONSOLE on the back of your QOR.32 unit. You can use a maximum of three iQ Frames with each QOR.32. One must be an iQ Main Frame.
2. Connect all iQ audio sources (microphones, CD players, etc) to inputs of your QOR.32.
3. Connect monitor amplifiers, headphone amplifiers, etc to outputs of your QOR.32. Be sure to set all amplifiers to their minimum volume setting.
4. Follow the instructions found in Chapter 1 to configure IP address settings for the QOR.32.
5. Refer to the User's Manuals packed with any other Axia Audio Nodes for information on how to configure IP addresses for these units.

What's Next?

When you've completed physically connecting your Axia hardware, jump to Chapter 2 for a quick tutorial on configuring audio sources. With that done, you'll be a hop, skip, jump away from being on-air! After that, you'll likely want to do some in-depth reading about all

The iQ Family: (top L-R) iQ 6-Fader, iQ 8-Fader, iQ Phone, iQ Main Frame, (bottom) QOR.32 and QOR Backup PSU

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your new iQ can do. Here's a brief description of the contents of the following chapters:

- **Chapter 1: iQ Frames and QOR.32** explains connections and basic iQ setup.

- **Chapter 2: iQ Inputs and Outputs** explains how to generate Source Profiles and construct backfeeds for selected sources.

- **Chapter 3: iQ Operations** takes you behind the scenes to explore operator controls and options.

- **Chapter 4:Show Profiles** illustrates how to set and save unique "snapshots" tailored for specific shows. These Show Profiles can be instantly recalled whenever needed.

- **Chapter 5: GPIO** tells how to associate routable logic commands with any audio source.

- **Chapter 6: Advanced iQ Controls** discusses advanced features that are configured in the iQ configuration web pages.

- **Chapter 7: Livewire Networking and iQ** will tell you how to connect your iQ to a network and reap the benefits of networked studio systems.

- **Appendices** provide additional technical specifications and a complete set of block diagrams for your reference.

Read on. Enjoy your iQ.

Stay up to date! We recommend joining the Axia Tech mailing list to ensure that you receive immediate updates regarding new software or documentation releases. You can do this by clicking the "Sign Up Here" link at the top of AxiaAudio.com/manuals/ & AxiaAudio.com/downloads/.

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Chapter One:

Setup and Connections

Introduction

If you are reading this manual, you are probably the proud owner of a new iQ console. You've read the Getting Started section, are probably already passing audio, and are hungry for more knowledge. Here we go!

The Basics

iQ was designed to get you on the air as quickly as possible with the least amount of effort. It's the perfect standalone radio console (and it even networks, too - see **Chapter 7: Livewire Networking and iQ** for details on how to do that).

This chapter covers connecting iQ to your other studio gear, such as microphones, CD players and other audio playback devices. The audio outputs of the QOR.32 connect to control room monitors, preview (cue) speaker, headphones amplifiers and audio recording devices. These external audio devices may be analog or AES devices.

The GPIO (General Purpose Input Output) ports provide logic control interfaces to devices such as air lights, recorders and CD players.

The 100 Mbps Ethernet ports may be used to connect PCs running Axia's IP-Audio driver, to expand your system by adding other Livewire devices such as Axia Audio Nodes, or equipment from Axia Partners (see AxiaAudio.com/partners/ for the latest list of companies whose equipment connects directly to Axia networks).

1000 Mbps (Gigabit) Ethernet ports are used to connect to other QOR.32 units or an Ethernet core switch — another topic covered in Chapter 7.

6-pin Molex connectors are used to connect your iQ Main, iQ Frames (max of 3 including Main) and CAN-Bus accessory panels. A single cable from each Frame will be used to connect it to the QOR.32. Each iQ Frame must have a dedicated Console port. Accessory modules can be daisy-chained from the CANBus Accessory port.

The D-sub combo connector connects ONLY to your optional QOR Backup power supply. The IEC receptacle is for your A.C. mains power connection.

Assigning an IP Address

Before you can configure your iQ hardware, you'll need to assign it an IP address. Press-and-hold the **Meter** and **Clock** keys for three seconds. The Studio display now shows the options and the Studio Monitor control is used to navigate, select IP Address options and change parameter values. Consult your network administrator if you are unsure about what address to use.

Each iQ system requires a single, fixed IP address. The iQ Frames are controllers for the QOR.32 engine and they share the same IP addresses. If the iQ is standalone, the default IP address will probably be fine. See Chapter 7 for more details when multiple iQ's are used or when your iQ is a part of a larger network.

Notes on Physical Installation

The QOR.32 is fan-free, so it can be located in any studio without fear of unwanted noise. Those vents and heat sinks serve a very important purpose! Be sure to mount the QOR in an equipment rack with free air flow. We recommend using a ventilated 1RU rack spacer above and below the QOR.32 to ensure adequate ventilation.

To install the iQ Frames in your studio, all you need is a desk — no console cutout required. You may also rack-mount your iQ Main Frame using the included rack-mount hardware. This same hardware serves double duty to join your iQ Frames together if you prefer one, continuous console rather than individual units.

To join iQ console sections:

Remove the adjacent side bezels of the iQ Frames that you wish to join and attach both rack-mount flanges to one of the frames as illustrated on the next page.

Flip the iQ frames over and use the rack-mount

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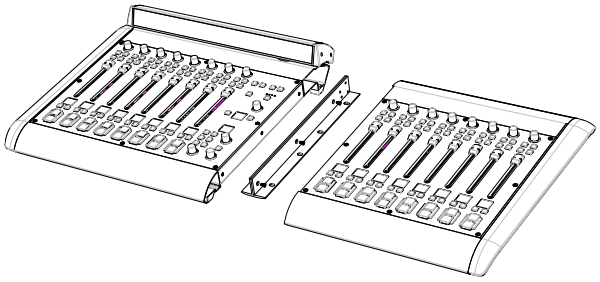
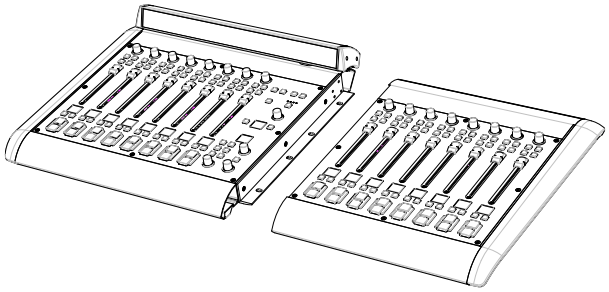
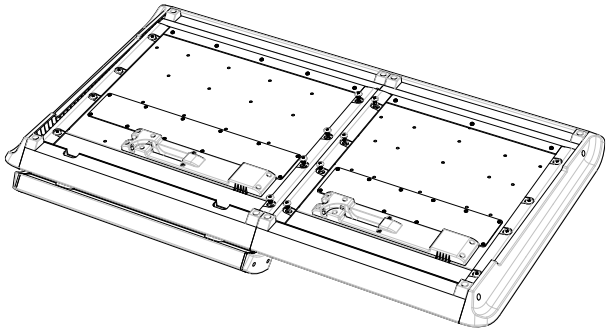


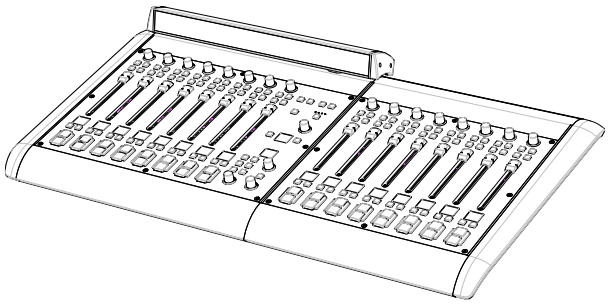


screws to securely attach the rack-mount flanges to the underside of the iQ Frames.

The physical arrangement of the frames is complete-



ly arbitrary. The channel assignments are determined by the iQ Main port to which you connect each iQ frame.



QOR.32: Front Panel

The indicator panel of the QOR.32, shown on the following page, is very simple. There are no controls for you to push or turn. Configuration and setup is performed from the console itself or through the iQ web browser interface.

Front Panel Indicators

Even though there are no knobs or dials, the front panel has some very useful indicators that tell you about the health and status of your QOR.32. In all cases, solid GREEN indicates normal operating conditions.

CHECK

This is a general health indicator for the QOR.32. If this indicator is RED, immediately check the web pages for abnormal operating conditions such as excessive CPU temperature. Do not ignore this indicator. Note that it is normal for this indicator to flash during boot-up.

LIVEWIRE

When lit, indicates that Livewire channels are being taken from the network. If no network sources are being received, this indicator is not illuminated.

SYNC

If your iQ is part of a larger network, a solid GREEN indicates the QOR.32 is synchronized as a slave to the Livewire network and that its internal clock is locked. Flashing GREEN indicates that sync packets are being received, but that iQ is not yet locked. It is normal for the **SYNC** indicator to flash for several seconds at startup. If it does not "lock" with a solid, non-flashing LED, this may indicate an incorrectly configured network switch. Check your Ethernet switch configuration or call Axia 24/7 Support for assistance.

MASTER

Solid GREEN indicates the QOR.32 is synchronized as a Master clock to the Livewire network. This indicator will always be green for a standalone console. If you have any other Livewire devices, they should be reporting Sync or Slave. There should be only one Master clock device in a Livewire network at any given time.

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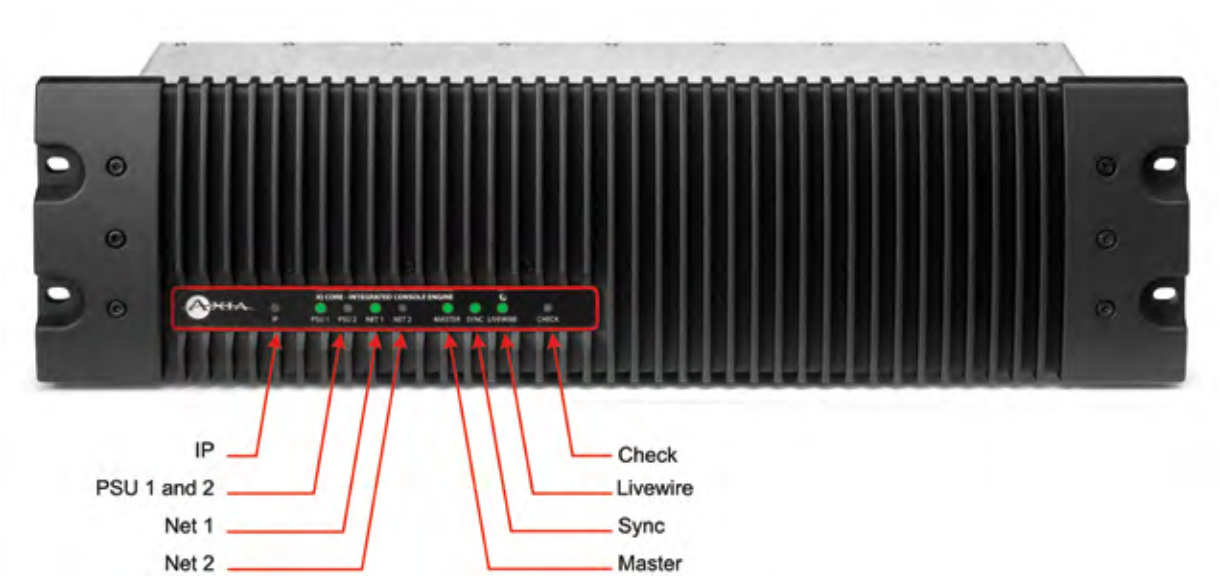

Figure 1-1: QOR.32 - Front Panel

Figure 1-1 shows both Master and Sync illuminated for illustration purposes only.

Note: The MASTER and SYNC indicators are not normally ON at the same time since the QOR.32 will be either a Master or Slave. This principle applies to all Axia Livewire devices. Any Livewire network will have only a single Master.

NET 1 and NET 2

These indicators provide the status of the two 1000 Mbsec (Gigabit) NICs in the QOR.32. Note that the unit can be used with either or both ports connected to properly configured Ethernet switches or other QOR.32 units.

When the Gig1 or Gig2 ports have active connections, the NET1 or NET2 lamps (respectively) will illuminate. If a network cable is connected to a Gig port and the corresponding NET lamp is unlit, a problem with the network connection is indicated.

When a disconnected Ethernet link has been re-established, the NET LED will blink with a 50% duty cycle for about 5 seconds as the network activity is resumed.

Please consult Axia's Ethernet switch configuration guides for details when using Core switches in a larger network. Ethernet Switch guides may be found on our web site at AxiaAudio.com/manuals/.

PSU

There are two PSU indicators providing assurance that the QOR.32 power supply rails are normal. Solid GREEN indicates normal power supply status.

The PSU2 indicator is active only when am QOR Backup is present and when the iQ console is configured to incorporate the QOR Backup.

IP

This indicator will illuminate upon detection of an external Ethernet core switch connected to the QOR.

QOR.32: Rear Panel

Power

- AC Mains: There is one standard IEC receptacle for your mains power for voltages in the range from 100 to 240 VAC at either 50 or 60 Hz.
- PSU2 (Backup): This is a D-sub combo connector for use only with the QOR Backup 48 VDC power supply. Connect your optional backup power supply with the provided cable.

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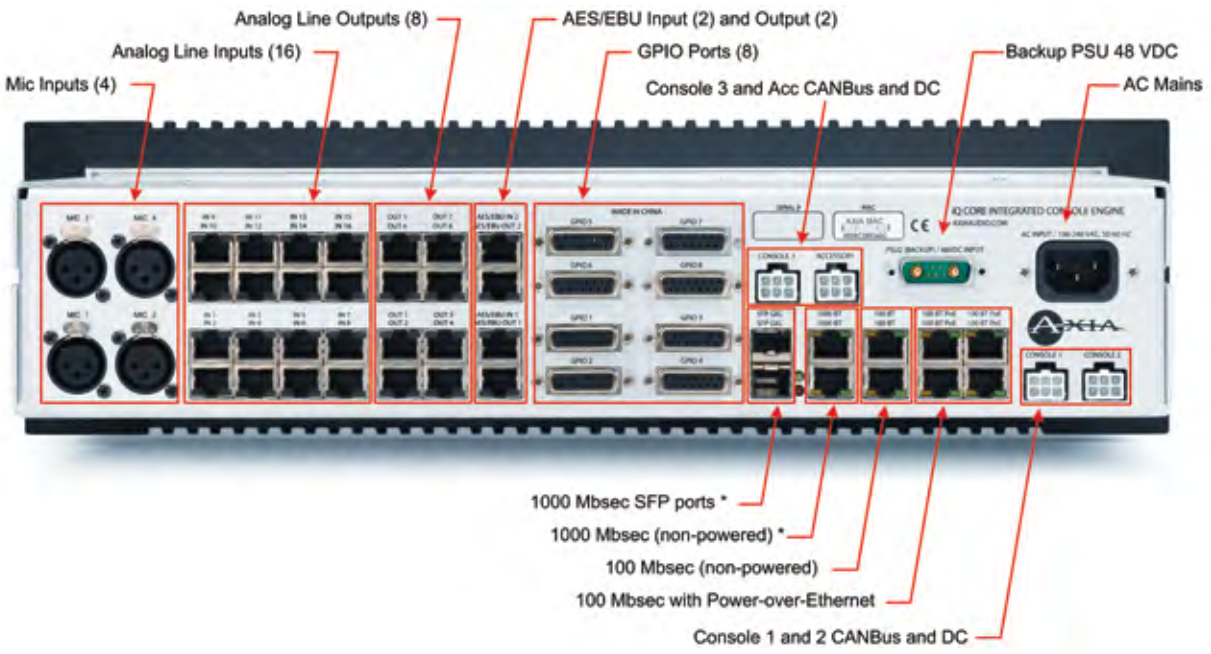

Analog Line Outputs (8)
AES/EBU Input (2) and Output (2)
Analog Line Inputs (16)
GPIO Ports (8)
Backup PSU 48 VDC
Mic Inputs (4)
Console 3 and Acc CANBus and DC
AC Mains
1000 Mbsec SFP ports *
1000 Mbsec (non-powered) *
100 Mbsec (non-powered)
100 Mbsec with Power-over-Ethernet
Console 1 and 2 CANBus and DC

Figure 1-2: QOR.32 - Rear Panel Connections

Audio Connections

The QOR.32's rear panel contains all of the connectors used for audio I/O, Ethernet, GPIO, power supply and the connections to your iQ frames. Note that we use RJ-45 connectors for three purposes:

- Analog audio inputs and outputs
- AES audio inputs and outputs
- Ethernet (some with PoE - Power over Ethernet)

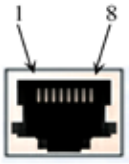
It is important to follow the proper conventions for wiring these connectors and ensure that the connector functions are not confused as damage may result if you plug a network cable into an audio input.

Analog and AES Audio

The connector pin functions shown in Figure 1-3 are the same for both the AES and Analog inputs and outputs.

The nominal audio level for analog line inputs and outputs is +4 dBm. This audio level will provide you with 20 dB of headroom.

Note: The well-labelled RJ-45 connectors on the QOR.32 rear panel are used for different functions. Be sure to use them only for their intended purpose as described in this section.



LINE and AES INPUT CONNECTORS	
Pin	Function: Analog/AES
1	Left Channel Input + /AES +
2	Left Channel Input - /AES -
3	Right Channel Input +
4	Not Connected
5	Not Connected
6	Right Channel Input -
7	Not Connected
8	Not Connected

Figure 1-3: RJ-45 Audio Connector Pinouts

Microphone Inputs

There are four XLR-F connectors on the rear panel for connection of microphone inputs. These connectors use the standard wiring convention for 3-pin XLR audio connectors. These connectors may have 48-volt Phantom power enabled via the QOR.32's web page configuration. Please take appropriate precautions if you connect anything other than a microphone to these inputs when Phantom power is enabled.

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GPIO Connections

The QOR.32 includes eight GPIO ports, with pinouts in the same configuration as the GPIO ports on other Axia products. Please refer to **Chapter 5: Configuring GPIO** for the functions of these ports and wiring diagrams for their DB-15 connectors.

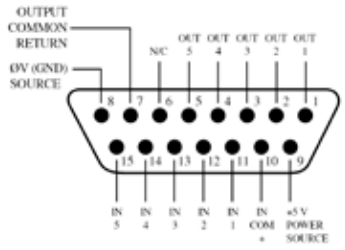

Figure 1-4: GPIO Connector Pin-Outs

In most cases, a GPIO port will be associated with a single source such as a CD player, studio microphone, profanity delay, *et cetera.*

Optional PathfinderPC software may also be used to monitor and control GPIO for advanced applications.

The interconnections to GPIO ports will vary depending on the type external equipment being used and whether or not voltage is supplied by an external device. **Chapter 5: Configuring GPIO** provides these details.

Ethernet Connections

The QOR.32 has three types of Ethernet connections and it is important to use them as intended since the internal Ethernet switch is configured in a specific manner. The types of connectors available are:

- 100 Mbps PoE (Power-over-Ethernet) ports designed to be used with future Livewire accessories that will obtain their power directly from their Ethernet connections. These ports may also be safely used with standard, non-PoE devices.
- 100 Mbps Ethernet standard ports are used to connect PCs or other Livewire devices to your Livewire network. These devices might include additional Livewire nodes or PCs running the Axia IP-Audio driver.
- Two 1000 Mbps (Gigabit) ports are used for connections to other QOR.32 units, or, in larger networks, for connections to an Ethernet Core switch. Note that these two ports are used as trunks and are not intended for connection to Livewire source devices such as Audio Nodes.

iQ Frame and CANBus Connections

iQ frames need only a single data / power connection to operate. The QOR.32 includes four power/CANBus connections for use in conjunction with your iQ control surface. The accessory CANBus port is an additional port that is available for future use.

Important: Like any electronic device, iQ can be affected by static electricity. Use of a personal grounding device is strongly recommended while handling the unit during installation.

Your iQ surface **must** be connected to a grounded metal permanent wiring system or other equipment grounding conductor using the grounding lug located on the console chassis. For ground sources, we recommend, in order of preference:

- "Station Ground," the heavy copper strap found in the walls and floors of many radio studios.
- AC Safety Ground — the "3rd prong" of a nearby outlet.
- A bonded electrical conduit.

#12 AWG GREEN stranded wire is the *minimum* wire gauge acceptable for grounding the iQ mixer.

Important: Grounding reduces the risk of electric shock by providing a "path of least resistance" for electric current. Improper grounding can result in a risk of electric shock.

Check with a qualified electrician if you are in doubt about how to properly ground this equipment. If your local electrical code prohibits the use of a Station Ground for this purpose, as described above, use the specific "Safety Ground" your local regulations mandate.

Console 1, 2, 3

There are three 6-pin Molex connector that are used to provide DC power (48 vdc) plus CANBus data to your iQ control surfaces.

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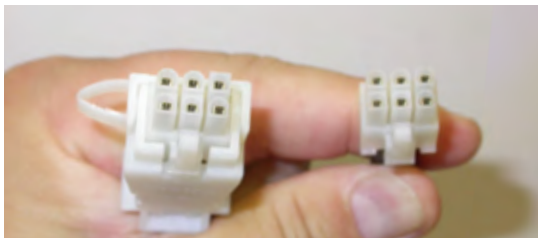

Figure 1-5: Detail of data/communication cable ends.

iQ frames must each be connected to a CONSOLE port on the QOR.32 using **only** the supplied 6-conductor cables. Each frame has a discrete connection to the QOR.32 A maximum of three fader frames (one Main plus two others of any type) can be connected to a QOR.32.

Note: Does it matter what Core port I connect a console frame to? Fader channel numbers are dependent on the QOR.32 console port to which you connect the fader frames. The Console 1 port will assign the lowest channel numbers. Console 2 and Console 3 will assign higher fader channel numbers. This scheme permits you to arrange your fader frames in any desired configuration and automatically assign channel numbers to your faders.

One end of each iQ power/communication cable is fitted with a strain relief. Connect this end to the Molex connector on the back of the QOR.32. Connect the other smaller connector to the Molex socket on each iQ Frame. Each Frame must have a dedicated power/communication cable.

Since the CANBus connection cables include power as well as data, there is a length restriction of approximately 50 feet. If you require longer cables than those supplied with your iQ Frames, please contact your Axia representative.

Accessory

The fourth 6-pin Molex connector on the rear panel of the QOR.32 is labelled ACCESSORY. This is the CANBus port that can be used to distribute data and 48 VDC to CANBus switch modules and accessory panels. Several accessory modules can be connected in a daisy-chain configuration with a termination on the last accessory panel. An Axia CANBus adaptor is available to convert the Molex CANBus connector to the RJ-45 type connector used on the Axia Accessory panels. This adaptor will simplify wiring of your CANBus accessories.

What is CANBus? Controller Area Network (CAN) is a multicast shared serial bus standard, originally developed in the 1980s by Robert Bosch GmbH, for connecting electronic control units (ECUs). Although initially created for automotive purposes, nowadays it is used in many embedded control applications.

The CAN data link layer protocol is standardized in ISO 11898-1 (2003).

IP Address Configuration

To access System Settings from the iQ console, press-and-hold the **Meter** and **Clock** key for three seconds. The Studio display now shows the options and the Studio Monitor control is used to navigate, select options and change parameter values. Options available are:

- IP Address
- Subnet Mask
- Gateway
- Save and Reboot

To exit, select EXIT and press the Studio Monitor control.

Note: After making changes to any QOR.32 IP address settings, you must reboot the unit for these changes to take effect.

"Gateway" settings on a QOR.32 are not usually required; however, a valid gateway enables access to the iQ configuration remotely, from outside your network. A gateway also facilitates the use of an external NTP server. Enter the IP address of your master router (the one with external network connections) whenever you're given the option to enter a gateway address.

Note: If your system employs an Ethernet core switch, the Ethernet core switch must have an IP address that is lower than any of your iQ units or Ethernet edge switches. This function of the IGMP standard ensures that the multicast querier is handled by the core switch if one exists. The querier will be passed off transparently to another switch should the core switch fail or be disconnected.

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Console Configuration

Now that your iQ has an IP address and you have a fader frame or two connected, you will need to tell the QOR.32 what is plugged to its CANBus slots so that fader numbers can be assigned. You will need to provide your computer with a static IP address that is in the same network as the iQ. For example, if you gave the iQ an IP address of 192.168.2.40, a good IP address for your computer could be 192.168.2.45.

Once your computer is configured, enter your iQ's IP address into your PC's browser, and when the iQ Control Center appears, choose **Console Config** from the iQ main menu. When you connect to the iQ, you will be prompted for a user name and password. By default, the user name is "**user**" and there is no password.

In the example shown in Figure 1-6, we have a Main Frame connected to Console Port 1 and a Phone Frame connected to Console Port 3. In this configuration, the faders on the Main Frame will be assigned channels 1 through 8 and the faders on the Phone Frame will be assigned channels 9 through 14.

What's Next?

Take a break! You're done with initial set-up. When you're ready, continue to Chapter 2: iQ Inputs and Outputs to walk through the software configuration of the Inputs and Outputs on your iQ.

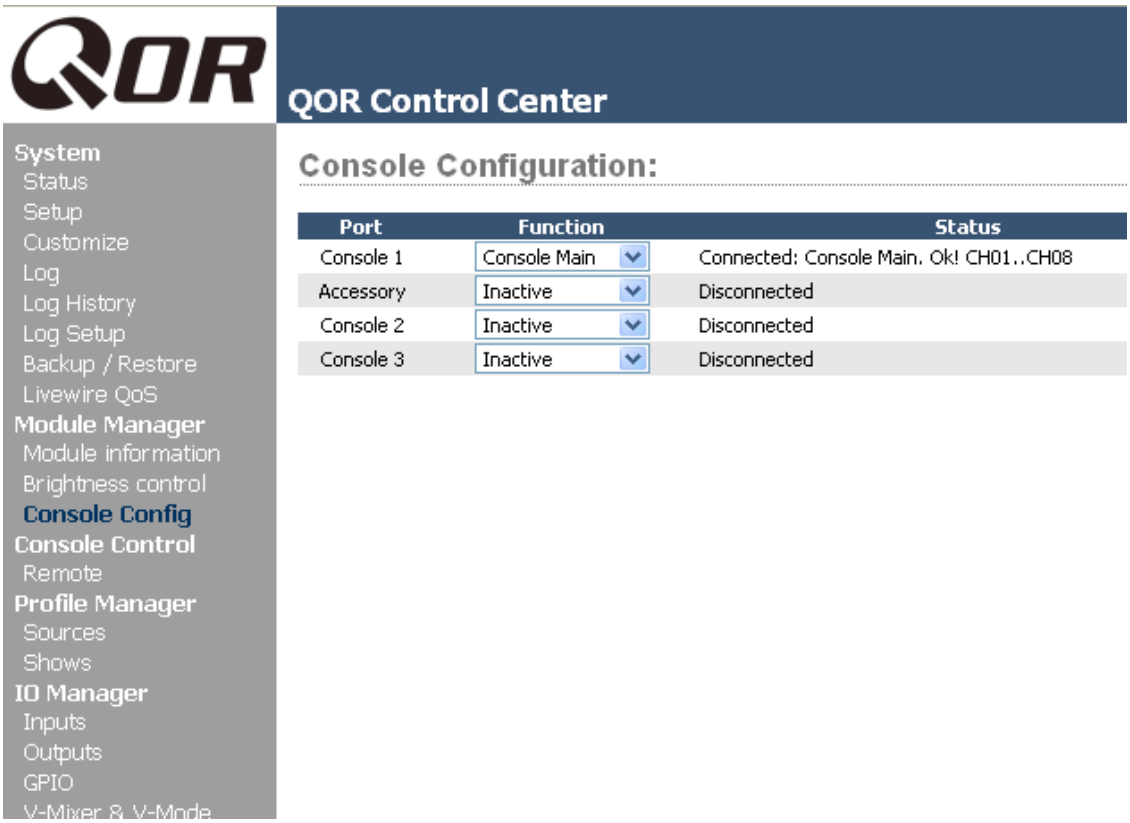

Figure 1-6: QOR Control Center

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Crimping the spade lugs,

the smell of soldering flux —

they'll be missed. (Not much.)

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Chapter Two:

Inputs and Outputs

In this chapter we'll discuss how to configure the inputs and outputs for your iQ system by using your computer's web browser. While browsing this chapter you may find useful the iQ block diagrams in Appendix B.

iQ has a built-in Ethernet switch and Web server for options configuration. To access it, all you need is a computer connected to its Ethernet switch. Since Livewire IP addresses are managed without DHCP, you will need to ensure that your PC has a manually-assigned IP address in the same subnet as the QOR.32. Contact your network administrator if you are not sure how to set up a fixed IP address for your PC (but if you're reading this, we think you've probably got it covered yourself).

Note: Axia web interfaces have been tested with Microsoft(TM) Internet Explorer, version 6 or later, but also work with other browsers.

Adobe(TM) Flash Player is used for some real-time monitoring features but is not essential for setup and configuration. If installed, your pop-up blocker must be disabled. You may download Adobe Flash Player at http://get.adobe.com/flashplayer/.

Once your PC is properly connected to the Axia Livewire network, direct your web browser to the IP address of your iQ. When you connect to the iQ, you will be prompted for a user name and password. By default, the user name is "**user**" and there is no password.

First, we'll walk through the **Audio IO Manager** to configure your **Inputs** and **Outputs**. Then, we will illustrate how **Source Profiles** and **Show Profiles** are used with your iQ system.

Inputs

Your QOR.32 has several connectors on the rear panel that accommodate microphones, analog stereo line and AES inputs. Chapter 1 discussed the details of these physical connectors. Now, let's look at the software configuration of these inputs.

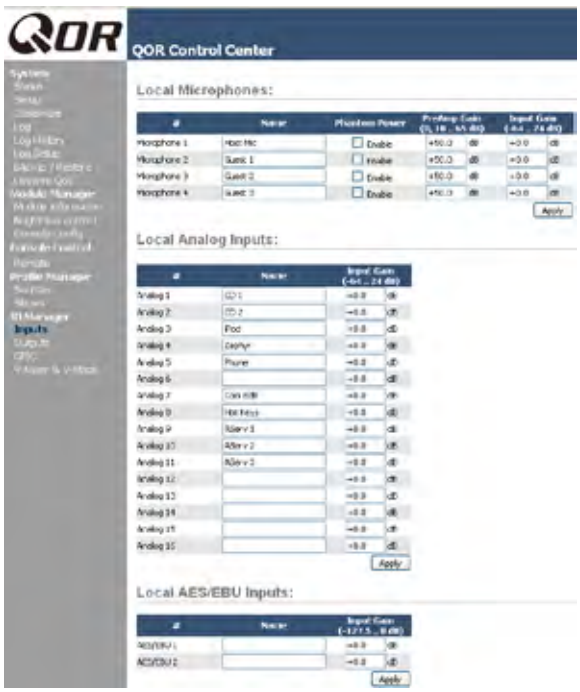

Figure 2-1: Audio IO Manager - Inputs

Figure 2-1 shows the web page configuration for Inputs for your QOR.32. There are three types of inputs.

Microphone Inputs

The four XLR-type connectors on the rear panel are intended to be used for mono microphone signals. Each of those inputs has the following parameters:

- **Phantom Power** (48 vdc) is individually enabled for each of the four microphone inputs by selecting this check box.
- **PreAmp Gain** is adjustable to a maximum of 65 dB. This setting will adjust the microphone level prior to all other signal processing.
- **Input Gain** is adjustable from -64 to +24 dB. If you are conservative with your PreAmp gain, you may wish to apply a few dB of additional gain at this stage.

Analog Line Inputs

These sixteen inputs are for line-level stereo signals connected to the analog line RJ-45 connectors on the rear panel. They have only one adjustment.

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- **Input gain** allows you to specify a gain from -64 to +24 dB.

AES/EBU Inputs

There are two AES/EBU digital inputs on RJ-45 connectors. These digital inputs are equipped with sample rate converters so a specific incoming sample rate or AES clock is not required.

- **Input gain** allows you to specify a gain from -127.5 to 0 dB.

Be sure to click **Apply** after making changes in each input section.

Now that the inputs have been tweaked for proper system audio levels, we can manage that audio and automatically associate logic with the different sources you have connected to your iQ. We use a concept that we call **Profiles** to do this.

What's a Profile?

A Profile is a group of parameters that are stored in memory for instant recall. The use of Profiles makes the operation of your iQ quick and intuitive. In the iQ console's design, there are two types of profiles: **Source Profiles** and **Show Profiles**. Show Profiles (discussed in detail in Chapter 3) contain all of the "snapshot" settings that would be associated with a console scene or preset. This terminology is commonly used in the sound reinforcement or recording studio industries.

Show Profiles

Our **Show Profiles** keep track of monitor bus settings, fader channel assignments, jock preferences, lockouts and many other parameters.

Source Profiles allow you to control access and configurations of the individual sources as they are used on each iQ console in your facility. Source Profile parameters may include name, source type, backfeed preferences, associated logic and much more.

Source Profiles

One of the most repetitive and tedious parts of studio building has always been tying "data" to audio sources. Consider the wiring of analog line selector modules: you needed a cable for the remote audio source, a set of wires for a "start" closure, another set for "stop" — even with TDM routers, an operation as seemingly simple as logic-follows-audio often turns out to be not so simple.

Mix-minus and IFB generation has also been a problem in the past. Too often it's a complicated process that requires air talent to correctly determine source and bus assignments at a moment's notice. How many times has unwanted audio been aired thanks to this error-prone procedure?

Your iQ eliminates these headaches by automatically merging audio, logic and program data into a single, routable information stream. Since audio in a Livewire network is transported as packetized data, it's easy for us to "piggyback" other data along with the audio. This association is accomplished through the use of Source Profiles.

A Source Profile contains all of the parameters that are unique to a specific audio input (source) as it applies to a specific iQ console. Source Profiles can assign modifiers to an audio input. Characteristics like Pan, Trim and even Mix-Minus source selections can be set in the Source Profile and automatically loaded whenever that source is assigned to an iQ fader.

The result of all this is that iQ is always presented with complete, consistent information about how you want a given audio input (source) to be handled. Your board operator will never have to worry about Mix-Minus again!

Source Configuration

The iQ web browser interface is used to configure Sources. To get started:

- Open the web browser on your computer and point it to the IP address you previously assigned to your iQ.
- You'll be prompted to enter a user name and password. The default user name is "**user**". Leave the

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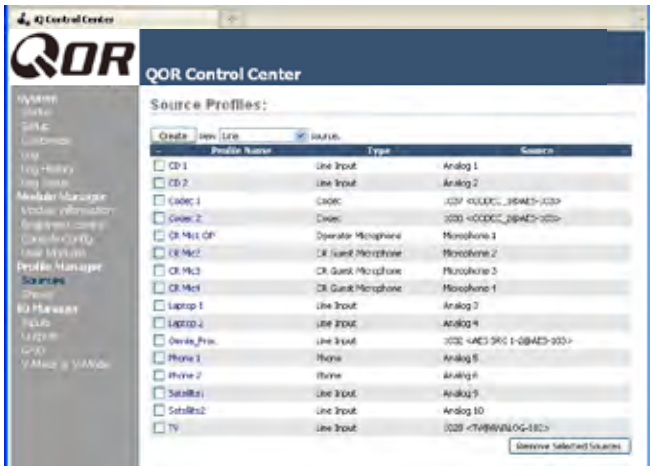

Figure 2-2: Source Profiles

password field blank.

- Select **Sources** to proceed to the source setup page.

You will now see the Sources section as shown in Figure 2-2. In this example, many of the sources have already been configured.

Note that iQ has three different classes of audio sources. Most originate with the rear panel input connectors and are used locally in the iQ; some audio sources may be obtained from other devices in your Livewire network, and some audio sources (PGM1, PGM2, etc) are generated internally.

With that in mind, let's discuss configuring your local sources and making them available for fader assignment.

Creating a New Source

Your first choice defines what type of source you're setting up, which is important since GPIO, mix-minus and other console behaviors are decided based on your choice. Your choices:

- **Operator** is the board operator's mic. It is the source mic for iQ TALK TO functions. Its logic mutes the CR monitors and Preview when ON.
- **Producer** is used for in-studio Producer's mic positions. It has associated GPIO logic which can operate TALK TO functions from a remote producer's panel. It also mutes CR monitors and Preview when ON.
- **CR Guest** is used for any other guest mic in the control room. Its associated logic automatically mutes the CR monitors and Preview when ON.
- **Studio Guest** is used for any mic located in a separate studio. Its logic mutes the Studio monitors when ON.
- **External Mic** is used for any mic located outside of a CR or studio. It functions like a Guest microphone but does not include any muting logic.
- **Line** is used for any line input audio source, analog or digital. A GPIO logic port can be used to provide machine start/stop pulses if desired.
- **Phone** defines this source as a hybrid or broadcast phone system input. A summed mono mix-minus is automatically provided.
- **Codec** marks this source as a codec. A dual mono mix-minus is provided; one PA feed (right) + one talent feed with talkback (left).
- **Computer Player** defines this source as originating from a PC. Associated GPIO logic can be used to send start/stop signals to a playout system.
- **Studio Feed** defines a source that receives a backfeed, and generates an IFB backfeed in return. This is intended for an external studio source which you wish to generate a talkback channel for.

Once you have selected the source type, click the **Create** button to proceed to the Source Profile options.

Figure 2-3 shows the setup options screen for a typical Microphone source. Figure 2-4 shows a Codec source which has a few different settings, and Figure 2-5 shows a Line source. The following sections describe these Source configurations in detail.

Source Type

This is a display-only parameter and shows the source type you selected in the previous step.

About Mics and Headphone Feeds: iQ provides you with several headphone options, all selectable from iQ monitor control section. The headphone output provides a feed intended for the Host (board-op's) mic position and includes the ability to monitor the Preview bus in headphones.

There are two headphone feeds from the studio monitor section, one for talent, one for guests. The *Studio* headphone output sends audio to all studio talent positions. Talent positions include

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a talkback channel that the board-op can use to communicate using the **Talk To Studio** function. The Guest Headphone does not include talkback.

Source Name

Each Source needs a name for display on the console's OLED channel displays. Names can be up to 10 characters long and may include spaces or underscore characters.

Source Input

This setting associates the source with an audio input. It may be a **local** input in which case you would choose a local Mic, Analog or AES from the drop-down menu. This source may also be a **Livewire** source which means that it is a network source originating from some other Livewire device. When you choose Livewire as your Source Input, you will specify a network source. See **Chapter 7: Livewire Networking and iQ** for details.

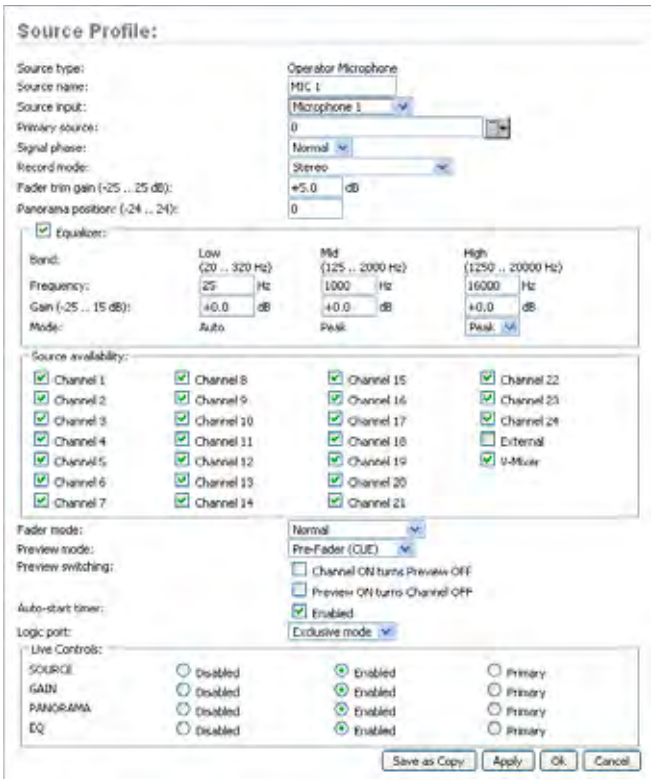

Figure 2-3: Operator Microphone Source

Primary Source

This pop-up window is used to select the network Livewire source ONLY when **Livewire** has been selected as your Source Input. See **Chapter 7: Livewire Networking and iQ** for more on this.

Signal Mode (Non-Microphone Sources)

Determines whether source will be treated as a mono or stereo source.

- **Stereo** feeds incoming L/R signal to left and right channels of assigned bus(es).
- **Left** feeds incoming left channel to both channels of assigned bus(es).
- **Right** feeds incoming right channel to both channels of assigned bus(es).
- **Sum** creates L+R mono mix of incoming stereo source and feeds it to both channels of assigned bus(es).

Signal Phase (Non-Microphone Sources)

Determines whether source will maintain normal or inverted phase relation.

Record Mode

The Record Bus of your iQ is a special variation of PGM 4 that is post-fader but pre ON/OFF. The mix of the Record bus is controlled by the **Record Mode** settings of each source. The options are:

- **Stereo**: delivers this source in stereo to the Record bus (default).
- **Sum to Left**: sums L+R of this source and delivers the sum to the Left channel of the Record bus.
- **Sum to Right**: sums L+R of this source and delivers the sum to the Right channel of the Record bus.

The last two options give you the ability to create a split Record bus which is commonly used for phone recorders. The Operator's mic can be recorded on one side of a stereo channel while all other sources are recorded on the other side.

Fader Trim Gain

This setting allows you to specify an amount of gain from -25 to +25 dB. Fader Trim Gain is applied in the signal path just before the fader.

Equalizer

Allows you to enable EQ function for the source as

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well as predefine the three-band EQ settings for the source.

Panorama Position

Lets you preset pan settings for this input. Pan is variable in 49 steps, center being 0, far left -24 and far right +24. This setting can be adjusted on the fly by the operator if permitted by show profile settings.

Source Availability

These check boxes determine which faders (or other inputs) you'll allow this source to be assigned to. For example, if your source is a Control Room mic, and you only want it to appear on the left-most fader, you would check only the box marked Channel 1. You might want to make a CD player available on any fader, so you'd check the boxes for all faders.

You might wish to prevent some sources – especially off-air signals – from ever being assigned to a fader, so you would un-check the boxes for all faders.

Figure 2-4: Codec Source

The two final check boxes, **External** and **V-Mixer**, determine whether the board-op will be able to assign the source directly to the CR and Studio monitor and headphone buses, or to iQ's Virtual Mixer.

To prevent a source from appearing on these inputs' selection lists, un-check the relevant box. Generally speaking, you'd want to restrict sources such as computers and CD players to fader assignments while sources such as off-air receivers would be marked to appear only on the External monitor selection list.

Fader Mode

Defines fader start actions and start logic:

- **Normal** conforms to the US method of requiring talent to manually turn the channel on and off.
- **Fader Start** follows the common European standard of activating the channel and associated machine logic when the fader is raised from - ∞.
- **Fader Start with Arm** works just like the Normal setting when the fader is not set to minimum position. When the fader is set to the minimum position, it can be in an Armed state. This armed state is entered by pressing the ON Button when the fader is down. The armed state means that the channel will go to the ON state when the fader is moved up. When in Arm state, the channel OFF lamp will be illuminated. The channel ON lamp will flash in "wink" mode - a long on-time and short off-time. For all fader modes, pressing the OFF button at any time will place the channel in the OFF state

Preview Mode

Permits you to choose whether **Preview** acts in CUE (pre-fader) or SOLO (post-fader) mode.

Preview Switching

There are two check boxes in this area. None, either or both may be checked. The options are:

- Channel ON turns Preview OFF
- Preview ON turns Channel OFF

Auto-Start Timer

When this box is checked, the count-up timer will start when the channel is turned ON.

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Figure 2-5: Line Source

Logic Port

Allows you disable GPIO machine logic to this audio source device or enable it in two modes. **Exclusive** mode permits GPIO control associated with only a single fader. **Shared** mode allows more than one user to send ON/OFF/START signals to the source via GPIO.

A check box can optionally enable **GPIO Ready** mode. This allows devices such as CD players or tape machines to signal their READY state to the operator through the OFF button LED. If a device is cueing, its OFF lamp will not be lit. Linking the device's OFF lamp to the Ready command means that a machine must be cued and ready before the OFF lamp illuminates. If enabled, the OFF lamp illuminates when the fader is OFF *and* the Ready command is active on the GPIO. If disabled, the OFF lamp illuminates normally whenever the fader is turned OFF.

Feed to Source (Codec, Phone, Studio Feed only)

If this source is a Phone or Codec type and there is a backfeed associated with it, this option determines what audio content is sent back to the source from the console.

- **Disabled** - No backfeed.
- **Auto (Pgm-1/Phone)** feeds the **Program 1** bus (minus the source) when this source's fader is ON, and feeds the Phone bus (minus the source) when the fader is OFF. Remember, the Phone bus is actually a special variant of Program 4. The Phone bus is pre-fader and pre-on/off to allow speaker-phone style operation thru the Operator's mic.
- **Program 1** always feeds the Program 1 bus, minus the source, regardless of the on/off state of the channel.
- **Program 2** feeds the Program 2 bus, minus the source.
- **Program 3** feeds the Program 3 bus, minus the source.
- **Program 4** feeds the Program 4 bus, minus the source.
- **Phone** feeds the Phone bus, minus the source. Phone is a pre-fader and pre-on/off variation of Program 4
- **Talk Only** is a "silent backfeed" that operates when the **Talk To** function is engaged, creating an IFB to the source.

Feed to Source Dim Gain (Codec, Phone, and Studio Feed only)

Normally, Talkback is sent over dimmed backfeed audio. If you want a hard interruption (Talkback interrupts Program audio), un-check the **Enable** check box, which mutes the audio. But maybe your jocks would like to have just their program audio dimmed, with Talkback heard over it so they can still monitor air while they're being talked to. In this case, input a value by which the program audio will be dimmed. Adjustment range is 0dB to -30dB.

About the PHONE, RECORD and PROGRAM 4 buses: The iQ PGM-4 mix bus is a special multi-purpose bus that does several things at once to make life easier for the operator.

Sources assigned to PGM-4 are also sent to the RECORD bus, a special post-fader, pre-on/off output that can be used to feed recording devices.

At the same time, sources assigned to PGM-4 are mixed and sent to the PHONE bus. PHONE is an internal bus which does not feed a separate output; instead, it picks up PGM-4 audio pre-

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fader and pre-On/Off and backfeeds this bus to callers (minus themselves, of course) when the channel is **OFF** and **AUTO** is selected as the **Feed To Source Mode**.

Live Controls

This group of radio buttons configures permits "live" functions for the **Options** control on each of the console's fader strips. Available options will vary depending on the source type. One setting may be defined as the **Primary** or "live" control, which means that the **Options** control will vary that setting as soon as you adjust the knob. For example, if PANORAMA has been defined as the Primary function, simply rotating the **Options** control will pan the source.

The other functions may be enabled or disabled as desired. Those that are **Enabled** may be chosen by the operator "on-the-fly" by depressing the **Options** control. When the control is pressed, the OLED display will list the options that you've checked as **Enabled** in this section of the configuration. Pressing the **Options** control selects the highlighted option and turning the **Options** control will adjust the parameter for that option. Depending on the enabled options, the operator will be able to adjust Source, Gain, Mode, Pan and Backfeed.

Remember to **save your work**! You may also "Save as Copy" if you intend to set up another, similar source — you can save a few clicks this way.

Figure 2-6: Assigning an Output from the list box

Congratulations — you've created a Source Profiles You can now bring up your new source on an iQ fader.

iQ Outputs

Output Types

Now that we have configured sources, let's look at the outputs of the iQ. Since iQ is a network device as well as a mixing console, you might expect that it has two kinds of outputs, Local and Livewire (network).

- **Local Outputs** - These outputs correspond to the audio connectors on the rear panel of the QOR.32. These are used to connect Control Room monitors, Preview speakers, headphone amplifiers, record devices and, of course, your air chain equipment and processing.
- **Livewire Outputs** - This is a group of four specified audio streams that can be delivered from your iQ to other devices in your Livewire network. See **Chapter 7: Livewire Networking and iQ** for more details on how this works.

Local Outputs

Your QOR.32 has eight stereo analog line outputs and two AES outputs. These may be configured to deliver:

» **Local sources** (4 microphones, 16 analog, 2 AES/EBU)

» **Backfeeds** to any of the above sources that are configured as Phone or Codec.

» Any of the **Program** or **Monitor** feeds that are created by the QOR.32 (CR Monitor, Studio Monitor CR Headphones, VMIX, VMODE, etc)

- **Output** - Using the drop-down menu, select the desired source that you want to deliver to your iQ local output.
- **Output Gain** - The output signal level may be attenuated to provide an optimal level for outboard devices. The gain range is from -127.5 (off) to 0.0 dB (unity gain).

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CAUTION - Once you have made a selection and applied it, audio is immediately delivered to the QOR output. Be sure to turn down all amplifier level controls to avoid damaging your precious equipment — especially your ears.

V-Mixer and V-Mode

The iQ **V-Mixer** is an "auxiliary" virtual mixer that can be used to mix five stereo sources and, from this mix, create another new source that may be used like any regular source.

V-Mode is a signal converter that allows you to manipulate some mono-mode sources. V-Mode has one input and one output, thus creating one additional source.

V-Mixer and V-Mode outputs are assigned in the **iQ Outputs** section and delivered to your studio or your Livewire network. Once V-Mixer and V-Mode signals are a part of the network, they can be loaded on any local or networked console fader, or routed to any other network destination.

V-Mixer Controls

The V-Mixer works independently of the iQ console. Static control of V-Mixer is available through the iQ web pages.

Even though the "V" in V-Mixer stands for "virtual", you can in fact perform a certain amount of "hands-on" mixing. Although you don't have physical control of the virtual faders or virtual ON/OFF switches, adjustments made to the V-Mixer take effect as soon as you apply them. While you may not want to operate an entire show this way, it's valuable to know that V-Mixer changes made "on the fly" will take effect immediately.

Figure 2-7 shows the V-Mixer and V-Mode setup found in the iQ web pages. At the top of that page, you can see the V-Mixer sub-mixer with its five stereo inputs. Below that you will see the V-Mode section. Let's look at the controls and see what they do.

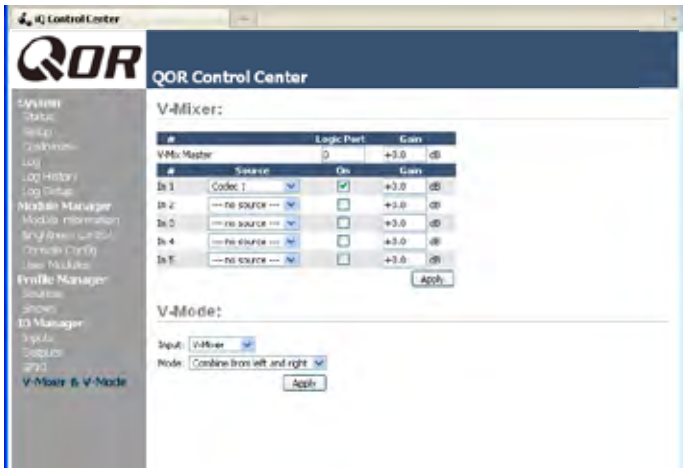

Figure 2-7: V-Mixer and V-Mode

At the top is the **V-Mix Master** field. This gives the option to assign a Livewire GPIO channel for control of the VMixer. This channel number also gets assigned to a GPIO port, allowing you to have ON/OFF control of VMix channels through GPIO. The last option applies a gain stage to the final mix the five inputs.

Controls for the V-mixer's input channels include:

- **Source:** From the drop-down menu, you may select any source previously defined with a Source Profile.
- **On:** Simply determines the ON/OFF status of the individual V-Mixer channel.
- **Gain:** This setting allows you to specify a gain setting for the channel that will control its mix level. The range is from -80 dB (effectively off) to +10dB. Note that you may also specify a gain setting for the V-Mix Master, which is the output of the V-Mixer.

At the bottom of the V-Mix section is an **Apply** button. Any changes you make will be saved when this button is pressed. Be sure to save your changes.

What does V-Mode do?

All of the program busses of the iQ are stereo. Sometimes, though, special circumstances require only one channel of an audio source, or a mono sum. V-Mode lets you accomplish this easily.

V-Mode Controls

V-Mode allows you to perform special manipulations on a stream. The controls are as follows:

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- **Input Selector** contains a drop down menu that allows you to select from a range of sources for each V-Mode input. You may choose from local Core sources including PGM-1/2/3/4, and VMIX.
- **Audio Mode** is the magic box that transforms your stereo stream into something else. You may choose from any of the following options:
  - » **Pass Stereo:** Passes the Left and Right channels as is, without modification.
  - » **Mono sum to L:** Creates mono sum and directs it to the Left channel only.
  - » **Mono sum to R:** Creates mono sum and directs it to the Right channel only.
  - » **Combine from left and right:** Creates a dual mono stream by summing the Left and Right channels.

The output of V-Mix and V-Mode channels can be assigned to outputs like any normal audio source.

Adding Backfeeds and GPIO

Since making a mix-minus and mapping contact closures is often done at the same time a new Source Profile is constructed, let's briefly recap those procedures.

Let's say you've connected a hybrid to Analog Input 5 of your iQ. You've constructed a Source Profile for it, and you now want to give it a mix-minus backfeed and set up a GPIO contact closure for the "take" and "drop" functions. Here's how:

1. Make sure that, in your hybrid's Source Profile, the **Source Type** option is set to "Phone" and the **Feed to Source** is set to "Auto (Program 1 / Phone)".
2. Use your Web browser to connect to the iQ Outputs screen (Figure 2-6) and set up the mix-minus for Output #5.
3. Just to the right of each **Local Output** name box , you'll see a drop-down selector. Click on the drop-down for output #3 and choose **to Analog 5** as shown in Figure 2-6. By simply choosing **to Analog 5**, iQ knows to deliver a backfeed that is a mix-minus of Analog Input 5. (The output chosen to deliver this backfeed is arbitrary - we chose Output 5 just for this example.)
4. Click **Apply**.
5. Now point your browser to the iQ **GPIO Configuration** screen (Figure 2-8). You may also use a GPIO Node in lieu of iQ's built-in GPIO ports; just point your browser to that Node's IP address instead.
6. The GPIO setup screen uses the same method of assigning devices to ports as other Livewire devices. Pick a port to map your Phone channel's contact closures to, using the list tool, and click **Apply**. Figure 2-8 shows the GPIO section of an IQ. (Axia Element consoles and GPIO nodes are similar, and also have eight GPIO ports.)

Figure 2-8: GPIO Configuration

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The process is complete: you've made a Source Profile for your phone hybrid, created a mix-minus, mapped it to an audio output, and associated a GPIO port for contact closures associated with the source.

To confirm, choose the **Options** key on any of your iQ's fader strips and load your new Phone source. Now press the **Talk** key just below the fader; you'll see the status change appear in the display above the channel to indicate that the operator's mic is talking to this telephone hybrid through it's backfeed channel.

Now look at the GPIO screen on your browser. Note the green indicators that have appeared on the port representing your hybrid; switch the iQ channel **On** and **Off** and you'll observe the tally change with the active pins.

What's Next

When you're ready, join us in **Chapter 3: Console Operation** where we'll show you how to use the various controls on the iQ mixing surface.

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Chapter Three:

Console Operation

With iQ, our goal is to provide you with the most efficient human-machine interface possible for fast-paced, complex programs where board operators must multitask without error. As such, iQ brings a whole new level of control and sophistication to the broadcast studio, while providing very familiar, intuitive operation.

Overview

iQ was designed to perform equally well in air or production studios. The clean interface enhances speed and accuracy without clutter or confusing controls.

In addition to the iQ Main frame, there is an 8-fader expansion frame, a 6-fader frame with controls for use with select Telos phone systems, and a 6-fader frame with ten programmable "User" keys (two groups of five keys).

In this chapter we'll first give you a high-level overview of iQ capabilities. Then, we'll give you detailed explanations of the various controls and functions.

Displays

Like a traditional console, iQ includes built-in meter displays. The iQ's OLED meters can be configured to VU or PPM metering standards.

The iQ Main Frame has dedicated meter displays for Program buses 1, 2 and 3, plus a multi-function meter. This meter, used in switched mode, toggles between a preset selection of metering options. The meter tally tells you what bus the meter is metering.

In addition to the meter displays, iQ, has a time of day clock and a count-up timer.

Show Profiles

iQ can be completely re-configured, instantly, to suit different types of shows. By recalling any of four previously stored Show Profiles, talent can change board settings from a phone and microphone intensive morning show to a personality-based music show – or any other kind – at the touch of a button.

Show Profiles are easily toggled by pressing the **Profile** key located at the top of Monitor section. Construction and administration of Show Profiles is covered in **Chapter 4: Show Profiles.**

Sources, Channels and Faders

During the course of this chapter, we'll refer often to **sources** and **channels.** *These are not the same!* "Sources" are microphones, CD players, outputs from the playout system, telephone hybrids, etc.

"Channel" would normally be used when referring to iQ's linear faders and associated on/off controls, OLED displays, bus assignment keys, etc.

Sources are assigned to faders for use on-air or in production. During initial configuration, the Source Profiles are programmed by the engineer for appropriate logic and options (as outlined in previous chapters); afterwards, whenever that source is assigned to a fader, source logic follows.

Fader settings are instantly reconfigured whenever a source is selected, to accommodate the unique requirements of the source. For example, a fader controlling a microphone source also controls appropriate monitor mutes. A fader controlling a line source may send "start" and "stop" commands when the channel is turned on and off.

Sources such as an off-air feed can also be assigned directly to the monitors for auditioning without being assigned to a fader.

Mix-Minus

Mix-minus setup, especially for live broadcasts, has always been one of the most confusing aspects of run-

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ning a radio console. iQ makes mix-minus easy by automating it. The operator never has to worry about sending a source back to itself and getting feedback— it just can't happen!

Several fixed and auto-switching mix-minus choices are possible, and are configured for each source when Source Profiles are defined by the engineer (see **Chapter 2** for details). Once this setup is done, no further tweaking is needed; the operator simply uses the source. A fader's status display tells operators when a particular source has a mix minus output, and even tells them which audio mix is being backfed.

iQ will generate as many mix-minus outputs as there are faders, each with its own automated mix minus feed. If you have 16 faders, you can have 16 mix-minuses!

GPIO

Chapter 2 explained how sources can have associated GPIO (General Purpose Input/Output) control associated with them. External GPIO interfaces are connected to iQ via the Livewire network (more details in **Chapter 7**) , so you can locate the actual machine connections either physically close to source equipment or in a central equipment room.

During installation, the engineer configures sources to accept and provide logic commands by selecting various options. For example, studio mics may be set up to automatically mute the studio monitor speakers and illuminate an on-air warning light when turned on. The same sources can be configured to accept GPIO logic inputs from buttons, so that each studio guest can have their own **On, Off, Talk,** and **Mute** keys.

Line sources can be configured to receive *start* and *stop* commands from the iQ as well. Start/stop messages can also be passed, via Ethernet, to a computer-based playout system.

Software

The iQ operating system uses a high-performance embedded Linux kernel to help ensure bulletproof, 24/7 operation. Software updates can be obtained from Axia via the Internet and applied by the station engineer. Axia Support recommends performing backups or making printouts of Show Profiles and other configuration data before applying new software updates.

iQ Main Frame - Callouts and Operation

This section provides a "bird's-eye view" of the iQ, with full descriptions of its controls and their functions.

Although an iQ console may have a fixed number of faders, you are not limited to that number of sources. Just like iQ's big brother, Element, you may assign any source to any fader. Unlike Element, iQ's metering is built-in.

The iQ Main Frame is laid out in a conventional manner with the monitor and ancillary controls located on the right side of the frame. Let's look at each of these sections in detail.

1. **Channel OFF Switch:** You know what this does.

2. **Channel ON Switch:** When the channel is in fader-normal mode the **ON** key turns the channel on and the **OFF** key turns it off. The channel **On** and **Off** functions also provide logic (start and stop pulses, monitor muting, etc.) specific to the source type.

   For example, if a control-room mic is assigned to a fader, the CR monitors and Preview speakers will mute when that fader is turned on and when CR microphone sources are Previewed. If a fader is hosting a microphone source, pressing the **On** key when the fader is already on mutes the channel, providing a "cough" function, until the **On** key is released.

3. **SOFT Key:** Each channel has a Soft Key. The OLED display tells you what function the soft key is currently controlling. The default action depends upon the type of input assigned to that fader, which is defined in the Source Profile. Current functions of the key are Mute, Talkback and phone hold. This key is also used to exit Channel Options edit mode.

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Figure 3-1: iQ Main - Callouts

4. **PREVIEW Key:** allows the operator to listen to sources before they air. iQ's **Preview** bus allows auditioning in full stereo. Individual source profiles can change Preview to Solo (post-fader) operation.

The **Preview** key acts like a latching switch. *Momentarily* pressing any channel's **Preview** key assigns that channel to the Preview bus; pressing it again removes the channel from Preview. To enable an operator to quickly listen to various sources, the Preview function can be interlocked: pressing **Preview** on any channel will remove any other channel from Preview mode.

If you want to preview multiple channels, pressing and *holding* any **Preview** key temporarily disables the interlock; other sources can be added to the Preview mix by pressing them. Conversely, channels can be removed from a multiple Preview selection by pressing and *holding* any lit **Preview** key and deselecting the individual channels you wish to remove from Preview.

A *momentary* press of any lit **Preview** key will remove all channels from Preview.

The interlock option for Preview can be disabled in any Show Profile's Monitor section so that users can gang preview sources without the need to press and hold **Preview**.

The audio from the Preview bus feeds any speakers dedicated to Preview, and can also be routed to the operator's headphones and CR monitors if desired. Preview speakers will be muted whenever and CR microphone is **ON**, or is assigned to the Preview bus.

5. **Channel Information Display:** This OLED display interacts with the **Channel Options** control and the **Soft** key. It is context-sensitive and can display many different parameters relevant to each fader.

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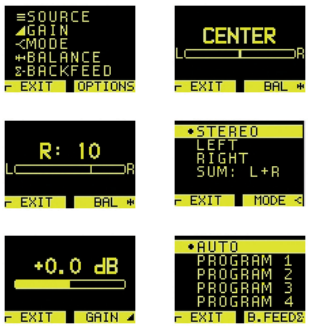
Normally the display will show the name of the source that is applied to the fader ("Zephyr"), and the function assigned to the **SOFT** key ("TALK").

When fader channel parameters are being edited, this display shows gain and pan settings, mode, backfeed selection and other parameters that will be dependent on the type of source.



When viewing these menus, the **Options** control is pressed to select the function, and rotated to set the value.

Just below the Source name is a status line. It shows the status of a channel. It is displayed in medium font. In the previous example, it is "[TALKBACK]."

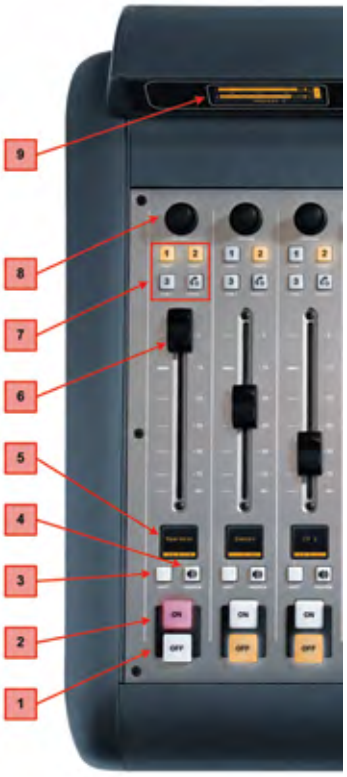


Figure 3-2: iQ Main - Callouts

Here is a list of the different status displays and their meanings:

» [TALK TO CR] - means that this channel is talking to Control Room. Used on Guest Microphone and Codec source types

» [OP TALKING] - means that this fader is an operator mic and it is currently in use for **Talkback** rather than feeding to Program buses

» [MUTED] - means that this channel is muted

» [TALKBACK] - means that this channel is being talked to, i.e., the talk bus is fed to the backfeed stream for this fader.

» Src-label - If the source has an associated label, it will be shown. Source label is normally used by playout systems to indicate song name and/or important information. Available only for Livewire sources.

» Listen Only - The source was loaded in listen-only mode. No GPIO control is available for this source's originating device.

» Used EW - The source is currently in use elsewhere and is in listen only mode. As soon as source is freed, it will be automatically reloaded in Full Control mode.

» Src Load Err - An error occurred during source loading. Re-load the source.

» No Backfeed - An error occurred during backfeed allocation for the source. For example, no resources are available to allocate backfeed stream.

» Src Waiting - means that a new source is waiting to be loaded. This state is accompanied by a blinking **OFF** key. Turn the channel **OFF** to load the new source.

6. **Fader:** The fader controls the volume of the input source. There are two modes for the fader: **fader-start** and **fader-normal:**

- When the channel is used in **fader-start** mode, pushing the fader all the way to the bottom of its travel turns the module off, and sends appropriate logic commands to source equipment. Moving the fader up turns the channel on and sends logic commands. In **fader-start** mode, the **On** and **Off** keys act more as indicators of channel status; the **On** key will not turn the channel on if the fader is at the bottom of its travel. Pressing

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the **Off** key while moving the fader up suppresses turning the channel **On.**

- In **fader-normal** mode, the on/off status and start/stop commands follow the channel ON/OFF switches independently of the fader position.

7. **Program Bus Assignment Keys:** Each channel is assigned to any of the three main output buses by selecting any (or all) of these program bus keys. Generally, PGM-1 is the main on-air bus and other buses are used for production or other programming requirements. All program outputs are post-fader and post on-off function.

The fourth bus functions as a regular output bus, but any sources feeding PGM-4 are also sent to a special **Record** bus that can feed a dedicated recording device, as well as to the **Phone** bus that sends mix-minus audio to any phone callers. These buses operate independently but simultaneously, allowing jocks plenty of operational flexibility.

» **PGM-4** bus audio output is post-fader, post-ON/OFF.

» **PGM-4 Record** bus audio output is post-fader, pre-ON/OFF.

» **Phone** bus audio is sent to callers pre-fader, pre-ON/OFF.

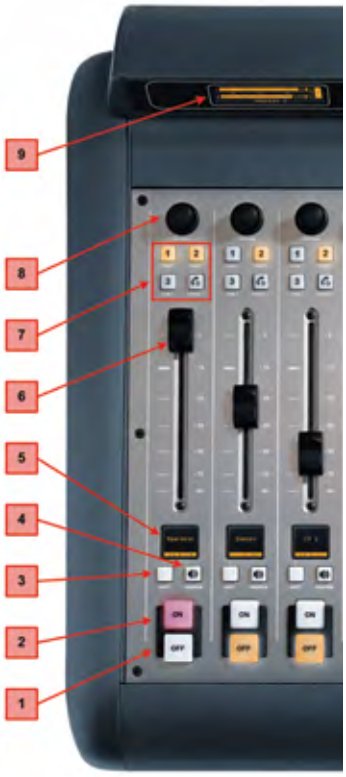

Figure 3-2: iQ Main - Callouts

8. **Channel Options Control:** This control operates in conjunction with the OLED fader display. Pushing the rotary encoder selects OPTIONS mode, displaying various choices on the OLED beneath. Rotate to select the desired option, and then push to "take." Once an option has been selected, you can rotate the control again to adjust the value of that parameter (if any). Press the **Soft** key to exit.

In the QOR.32's Web setup, you can also assign a default function to the rotary encoder. Doing so allows adjustments to fader options, gain trim, input gain trim, pan, or input selection to be made just by rotating the knob.

9. **PGM 1-2 Meter:** Always displays the output level of the IQ Program 1 bus.

10. **PGM 3-4 Meter:** This is a dual function meter. The left side of this meter always displays the output level for the Program 3 bus. The right side of this meter displays the output level of a bus that may be selected by the operator by using the Meter Select key (14). Options for this meter are: PGM 4 or Follow Monitor.

11. **TALK to Backfeed:** This key allows the operator to instantly talkback to any phone or codec source(s) by pressing a single key. Pressing the TALK to Backfeed key routes the board operator's mic to all existing backfeeds. i.e.: you can talk to a codec or phone caller's mix-minus feed by simply pushing TALK to Backfeed.

12. **Record:** places the iQ in **Record Mode.** Monitoring (CR Headphones) will switch from the current source to the Record Bus, The 3rd meter will display the Record Bus levels. Control Room Monitors and Preview speakers will be muted. Pressing a **Record** second time releases **Record Mode** and restores iQ to its previous state.

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13. **Clock and Timer Display:** This display includes both the Clock and the Timer. The Clock sections includes an NTP indicator that tells you when the iQ synchronized to an external NTP clock reference. The Timer section displays the count-up timer that may be controlled by fader-start or by the Timer controls on the iQ.

14. **Meter Key:** If all four bus meters are not set for constant display, this toggles the Soft (middle) meter between Program and Monitor metering.

15. **Clock Key:** Pressing this key toggles between AUTO and MANUAL modes for the count-up timer. AUTO allows it to be reset and started by any source starting that has it's timer start option enabled. MANUAL ignores those starts and follows the RUN/STOP/RESET keys only. Note that even if you are set to AUTO, the run/stop/reset keys still work.

To set the clock, push and hold the **Clock** key for 6 seconds to enter clock adjust mode. The **Clock** key will illuminate indicating that clock setup is active. Release the **Clock** key and press RUN-STOP to set the clock display forward, and press RESET to set it back. Press the **Clock** key again to save the current time and exit clock adjust mode.

If NTP is active and enabled (via web page configuration), the time cannot be adjusted manually.

16. **Timer Controls:** Pressing **RESET** zeroes the count-up timer. Pressing the **RUN/Stop** key manually starts or stops the count-up timer. The **RUN/Stop** key illuminates while the timer is running

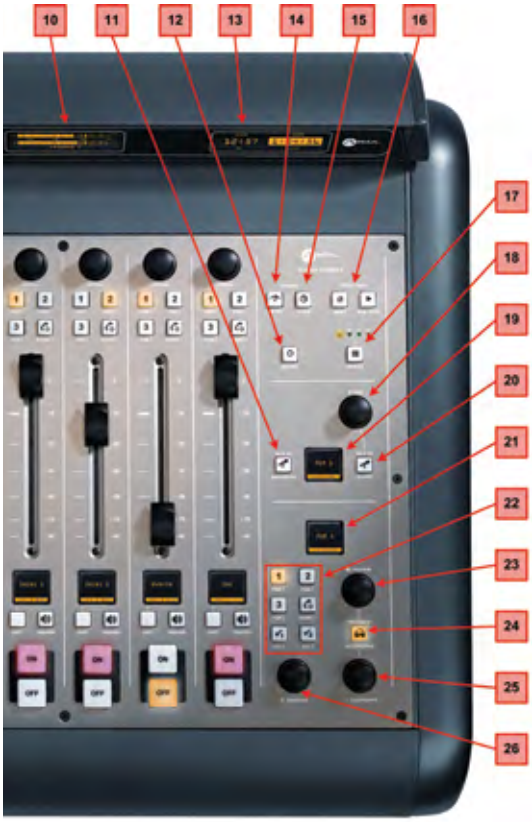

Figure 3-4: iQ Main - Console Callouts

17. **Profile Key:** This key allows you to select the active iQ Show Profile from a group of four pre-configured profiles. The Studio OLED display tells you which profile (A, B, C or D) is currently active. The Studio Monitor knob is used to navigate this screen. To exit this screen, press the **Profile** key. You can also push and hold the profile key for 5 seconds to reload the current profile.

18. **STUDIO:** "Studio" is defined here as another room separate from the Control Room, such as a talk studio or news booth. Pushing this control selects the Studio Monitor source; rotate it to adjust the volume of the Studio Monitor speakers. Note that the Studio monitors will be muted whenever any Studio Microphone is turned ON.

19. **STUDIO Monitor Display:** This OLED display indicates the volume and source that is being delivered your STUDIO monitors. This may be changed with the **STUDIO** control as described above.

20. **TALK to STUDIO Key:** This push-to-talk key allows the operator to communicate with all Studio guests simultaneously. The operator mic is routed directly to Studio Headphone and Studio Monitor outputs while this key is pressed.

21. **Control Room**

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Monitor Display: This is a context sensitive OLED display that indicates the volume and source that is being delivered to your Control Room monitors, CR Headphones and Preview.

22. **Control Room Monitor Select Keys:** This group of keys selects the source that is delivered to your control room monitor speakers. The operator may select from PGM 1, PGM 2, PGM 3, PGM 4 or two predesignated external sources. The external sources are typically used for off-air receivers and are specified in the web page configuration.

External 1 and External 2 have another function, in addition to their normal monitor-select action. If you press and hold one of these keys for 2 seconds, you will see that the Studio OLED display and Studio Monitor knob may be used to assign a source on-the-fly to that specific External Input. Press **Ext 1** or **Ext 2** again to exit this Select mode.

23. **PREVIEW Level Control:** Adjusts the volume level of the Preview output connected to your external powered **PREVIEW** speaker. Note that the **PREVIEW** speaker will be muted whenever any CR microphone is **ON** or when you are in **Record** mode.

24. **PREVIEW in HEADPHONE Key:** The **H/P PREV** key controls whether audio from the **Preview** bus will be fed to the board op's headphones, and if so, in what manner. Pressing this key toggles through the following options:

» **Off:** The operator will not hear Preview audio in the headphone channel.
» **ON (Stereo):** audio from the Preview channel overrides the **Headphone Monitor** selection and is sent to both the left and right channels of the operator's headphones.

25. **HEADPHONE Level Control:** Rotate to adjust the Headphone volume. Headphone source follows CR Monitor selection.

26. **MONITOR:** Adjusts the level of your Control Room Monitors. This output will automatically MUTE whenever any Control Room microphone is **ON** or when Record Mode is active

System Settings

To access System Settings from the iQ console, press and hold the **Meter** and **Clock** keys for three seconds. The Studio display shows the options and the Studio Monitor control is used to navigate, select options and change parameter values. Options available are:

» **IP Address**
» **Subnet Mask**
» **Gateway**
» **Save and Reboot**

To exit, select **EXIT** and press the Studio Monitor control.

iQ 8-Fader Expansion Frame

Operation of the iQ 8-Fader frame is identical to that of the faders on the iQ Main. As described in **Chapter 2**, fader number designations are determined by the QOR.32 Console port to which the Frame is connected.

iQ 6-Fader+Telco Expansion Frame

The iQ 6-Fader+Telco frame includes faders plus controls for a dual-hybrid telephone system. These controls are specifically designed to work with the Telos iQ6 phone system, or with the Telos VX VoIP broadcast phone system.

OLED Display: Call status (using exclusive Telos Status Symbols icons) and other information is presented on these context-sensitive displays. Indications are:

» Line 1 is available
» Line 2 is on hold
» Line 3 is locked to Hybrid 1 with caller ID shown
» Line 4 is blocked
» Line 5 is selected and waiting for digits to dial
» Line 6 is on-air on the fader to the right of the button column.

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Figure 3-6: iQ 8-Fader Frame

A completely dark display indicates that no line is connected to that port. A "pulsating" display indicates a ringing line.

If you're familiar with Telos phone systems, you'll find iQ's hybrid controls to be very familiar indeed!

VoIP in the broadcast studio: Voice over IP now dominates the telephone sector, so it's only natural for broadcasters to want to put VoIP to work achieving better fidelity and call-handling flexibility in the radio studio. After all, technology that sounds this great shouldn't be reserved just for the board room!

With broadcasters adopting IP-Audio as the "new norm" for studio infrastructure, it makes sense for the Telco to share the same IP-based studio systems used for studio audio. This allows phone systems to be integrated into the broadcast console as never before, facilitating seamless call-handling and even (dare we say it) interconnection between the business VoIP PBX and the on-air phone system. iQ was designed with this functionality in mind.

As a result, iQ requires a Telos iQ6 or a VX-series phone system to take advantage of this advanced on-console phone integration. iQ's hybrid controls are not compatible with older products, or those of other hybrid vendors, although the outputs of these products may be assigned to any fader and the phone system operated with its own proprietary controller.

Keypad: Used for placing outbound phone calls

Transfer: Used to create a "hook flash" in POTS analog phone systems. Depending on the way you've ordered your Telco service, this key may serve to activate features such as transfer or 3-Way Calling. This button does not function with ISDN phone lines.

Delay Dump: This control triggers your external profanity delay using Livewire GPIO logic. The details of this feature are still under development.

Block All: Pressing this key once will "busy" all phone lines (except those that are on-air or on hold), thus blocking incoming calls. Pressing the key a second time will release call blocking.

Line Buttons: Each line has 2 buttons, the left column for Hybrid 1 and the right column for Hybrid 2. Pressing a line button places the caller on that line on-air using the corresponding hybrid. Pressing a line button when a call is already on-air locks the call on-air, pre-

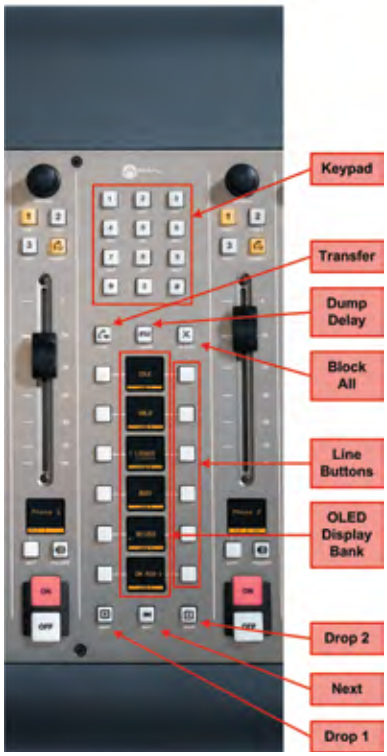

Figure 3-7: iQ 6-Fader+Telco (partial view)

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venting accidental disconnection. To unlock, press the line button a third time.

Drop 1 and 2 Buttons: These buttons will drop calls (in their respective column) that are currently on-air, if that call is not in the "locked" state described above.

Next: Selects the line which has been ringing longest. If no line is ringing, it selects the line that has been on (normal) hold the longest.

Channel Soft Key: At this writing, the soft key on a fader with a phone source assigned places the caller on hold.

iQ 6-Fader+User Keys Expansion Frame

The operation of faders found on this iQ 6-Fader frame is identical to the operation of the individual faders that are found on the iQ Main. Please refer to the callout descriptions for iQ Main in the previous section.

Each iQ 6-Fader+User Key frame also includes two banks of User Keys. Each group consists of five keys that may be programmed as extensions of two of the iQ's GPIO ports. For information on configuring and using these keys, please refer to Chapter 5: Configuring GPIO.

Figure 3-8: IQ 6-Fader Module with User Keys

Source-Specific Channel Controls

Some fader functions change their behavior to suit the type of source assigned to the fader. A Guest Mic input has unique functions different from those of a Codec input, and so forth. In this section we'll explain the channel functions unique to each type of source input.

Control Room Operator Mic Channel

The Control Room Operator microphone is the board operator's mic. It's always located in the Control Room, so activating a channel designated as the CR Operator mic affects CR Monitor speaker and Preview speaker muting.

When the board operator pushes a **Talkback** key, all output bus assignments for the Control Room Operator microphone are temporarily muted, while his mic's audio is routed to the requested **Talkback** destination. Releasing the key returns the channel outputs to normal.

Pressing the channel **ON** key for the CR Operator Mic while the channel is already on will mute the channel until the key is released, acting as a "**cough**" function for the board operator. On-air status and speaker mutes are unaffected by this action. The CR Operator microphone channel will mute the CR Monitors (Monitor 1) and the Preview speakers whenever the channel is **On,** or if **Preview** or **Record Mode Engage** keys are selected.

Producer Microphone Channel

The Producer's microphone is meant to be used at a position within the Control Room where a morning show or talk show producer would normally sit. This mic type mimics the operation of the Control Room mic described above, but does not include the "cough" function; also, a Producer mic can use Talkback to talk to the board op, but cannot talk directly to the Studio talkback channel.

Control Room Guest Microphone Channel

There are often microphones in the Control Room other than the board operator's; i.e., an in-studio guest or perhaps an announcer located physically near the board

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op. These microphones also control the muting of the Control Room monitor speakers.

Control Room Guest Microphone channels will mute the Control Room speakers and the Preview speakers whenever the channel is **ON,** or if **Preview** key is selected.

Studio Microphone Channel

Another type of microphone channel is a Studio Microphone. This mic is typically located in a location separate from the control room — perhaps a voice-over booth, a talk studio separated by glass, or a news booth.

Logic for Studio Microphone channels is identical to that of the Control Room Guest Microphone channel. The **Studio Monitor** speakers mute when a Studio Microphone channel is turned on, or if it is assigned to the **Program-4/Record** bus.

External Microphone Channel

This type of microphone operates identically to a studio or CR guest microphone except that is does not incorporate any monitor muting functions.

Line Channel

Line-level devices like CD players, tape players, etc., use the Line Channel profile. The Line Channel is stereo, but the user can change the input mode to mono, left only or right only by using the **Pan & Mode** key in the Master Module's **Channel Options** section.

Line channels have a variety of remote logic functions available at the GPIO interface. **ON** and **OFF** keys can be remotely controlled, as well as the **Preview** key. Each function has a corresponding lamp driver.

You'll also find a **Ready** command which will remotely illuminate the **OFF** lamp on the IQ channel and activate the GPIO **OFF** lamp driver, allowing source equipment to signal the operator with either a steady-state **OFF** key (indicating source ready) or a flashing **OFF** lamp (indicating source next). Refer to the GPIO Node User's Manual for information on interfacing to the GPIO's inputs and outputs.

Phone Channel

The Phone Channel profile is used, naturally, for telephone hybrid audio sources. Each Phone Channel has its own discrete Feed-to-Source mix-minus output.

Each iQ can accommodate as many unique, automatically-generated mix-minus feeds as it has faders. If the Feed-to-Source mode is set to "Auto", (the most common option - see **Chapter 2: iQ Inputs and Outputs** for the section entitled "Source Profile Options"), phone callers hear the output of the **Program-1** bus, minus himself, when the channels they're assigned to are **ON**. When the caller's channel is **OFF**, their channel's **Talkback** key is lit and they hear the Board Operator's mic routed to their **Talkback** feed.

Phone feed-to-source outputs can also be locked to backfeed only **PGM-1, PGM-2, PGM-3** or **PGM-4**, using the options provided when constructing the Source Profile for your hybrid. This automatic switching mode makes it very easy to prep callers and then seamlessly take them to air with a minimum of key pushes.

Codec Channel

The Codec Channel is used for codec sources. Like the Phone Channel, each codec source is brought up on its own channel, and an individual Feed-to-Source (mix minus) output is provided for each codec. Codec Channels can be turned on and off remotely and provide on/off status to a remote logic device. **Remote Talk** and **Remote Mute** are also provided, allowing talent to take control using their own On/Off/Mute/Talk panels.

Talk enables remote talent to communicate with the board op using the **Talkback** bus. When **Talk** is activated, all outputs for that channel are muted and the source audio is fed to the **Talkback** bus; the channel's **OLED** displays `TALK to CR`. When the user stops talking, the channel returns to normal.

When the operator uses the Softkey to talk to the phone or codec source, the OLED displays `TALKBACK`.

When the remote mute function is activated, the OLED displays `MUTED` and all the channel outputs are

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muted until the command is released.

The mix-minus output (configured in the Source Profile section) normally feeds **Program-1** audio to the remote, but can be switched to **Program-2, 3, 4 or Phone**. The Feed-to-Source output on a Codec Channel is a dual mono output, occupying both sides of the stereo pair. The Left output is normally used for remote talent's headphone feed, and is interrupted by **Talkback** audio when the board op talks to the remote. The Right output sends uninterrupted program audio (without talkback) for use as a PA feed.

Remote Control

Console channels can be turned on and off remotely, and will provide on/off status to a remote logic device. **Remote Preview** is also provided, as are lamp drivers for **On, Off** and **Preview. Start** and **Stop** pulses can be sent when the channel is turned on or off, respectively. See **Chapter 5: Configuring GPIO** for detailed information interfacing to GPIO inputs and outputs.

What's Next

Now that you know how what all the controls do, let's get acquainted with one of iQ's most powerful functions: Show Profiles.

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Do digital streams

dream of electric DJs?

Just Bradbury knows.

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Chapter Four:

Show Profiles

If you've read **Chapter 2: Inputs and Outputs**, you already have a good understanding of Source Profiles. In the same way that Source Profiles allow you to determine how an individual channel is configured when a source is loaded to a fader, Show Profiles let you build configuration files that determine how the entire console behaves, which sources are loaded, and what channels they appear on — "snapshots" that you can load at will to recall baseline show settings.

For instance, you could use Show Profiles as a "return to zero" command. iQ is highly customizable; jocks can might load new sources, change EQ or make other adjustments during their show. A Show Profile can reset the console to its default state for the next operator.

Or, you could use Show Profiles to define different types of broadcasts – one for the morning show, one for talk segments, one for musical guest interviews, one for unattended operation – that need only to be loaded to instantly optimize the board for use with that situation.

You can save and recall up to four unique Show Profiles to customize your iQ for different users or shows.

Important note about using Show Profiles: If you load a new Show Profile while any channels are still ON, those channels will remain in their current state - that is, any new source that is assigned to that channel by the Show Profile will not be loaded - until the channels are turned OFF, at which time, the new source will load for that channel. This is to prevent operators from accidentally taking an active source off the air. This also enables operators to load a new Show Profile a few minutes prior to needing it, secure in the knowledge that any sources that are ON will not be affected. *Note that this notification will be given even if the "new" source is the same as the one currently on-air.*

The surface will signal the operator that a source change is pending by blinking the OFF button and displaying the message **Src Waiting** on that channel's OLED display. Turning OFF a channel with a pending source change will immediately load the waiting source.

Creating A Show Profile

Build A Show

iQ's Web interface, which you've used to construct Source Profiles, is also used to help build Show Profiles, so make sure a computer connected to your QOR.32 or Livewire network is within easy reach.

Your iQ is shipped from the factory with a default Show Profile. This loads the first time you turn on your iQ; it provides the "template" you'll use to construct custom Show Profiles. You've no doubt been exploring your iQ, so you might want to reload **Default Show Profile A with** the **Profile** key located in the iQ Master section. Simply press and hold the **A** key and, after a few seconds, the default profile will load, resetting the mixing surface to its factory state.

The first step in building a Show Profile is to set up iQ using the Channel Options, Monitor, Headphone, Studio and other board options as described in **Chapter 3: iQ Operations**. Get started by assigning a source to each iQ fader using the **Options** knobs at the top of each channel.

After you've assigned a source for each fader, you can configure the rest of the Channel Options:

- Gain,
- Pan / Balance,
- Feed to Source.

When you've configured all Channel Options, continue on and make monitor and headphone selections since these are all saved in Show Profiles as well.

When you've got the board configured to your satisfaction, proceed to the next section.

Capture It!

It's now time to save your iQ configuration as a Show Profile. Enter your iQ's IP address in your Web browser. When the Main Menu appears, choose **Shows** on the

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Figure 4-1: Show Profiles screen

sidebar menu. This is where you'll come whenever you need to capture, construct or administer a Show Profile.

Under the Show Profiles list, you'll find four profiles listed with three options for each Show Profile:

- **Edit.** Choose this option to manually edit any existing show profiles.
- **Capture.** Takes a "snapshot" of the current iQ console state and saves it for recall. This is the option we'll use in just a moment.
- **Reset.** Choose this option when you want to construct an entire Show Profile completely from scratch and reset all parameters to their default state or value.

You've already set up your iQ, so now you can just "capture" your settings for further use. Choose **Capture** from the menu. iQ allows you to capture up to four Show Profiles which are saved as A, B, C and D. You may also give meaningful names to these Show Profiles as described in the next section.

There may be a few more options you'd like to tweak, since not all options are accessible from iQ console itself. Let's go a little deeper into Show Profiles to find out exactly what's available to you.

Suggestion: As part of iQ training, show your talent how to use the Channel Options to assign sources and set monitor options. Let them set up the board exactly the way they want it, then use the Capture command to save their work. This way, talent gets the satisfaction of personalizing their own iQ configuration — and saves you the work!

Show Profile Options

Although the ability to create Show Profiles using the "capture" function is powerful, there are a few more options available exclusively via the iQ Web interface. You will probably find that a combination of console setup, capture and edit works best.

When you select any Show Profile, you will enter the edit screen as shown in Figure 4-2. Notice that there is a section for your iQ faders, as well as sections for Phone, Monitors, External Inputs and some general User Interface settings. At the very top of the page is the **Show Name**. Use this to give the Profile a descriptive appellation

We will now look at the individual Show Profile settings in detail.

Fader Channels

This section has settings for each fader channel. When this specific Show Profile is loaded, these settings will be applied.

- **SOURCE:** You can change the source using the drop-down box. The name of the source you assign will be displayed on the OLED below the fader.
- **ON/OFF:** Specifies the channel ON/OFF state when the profile is loaded.
- **PGM1/2/3/4:** Determines the default bus assignments for this channel when the Show Profile is loaded. When a check-box is selected, the source will be assigned to the corresponding bus.
- **Group Start:** There are three possible settings:

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» **Independent** - this fader is not associated with any other fader and operates independently

» **Master** - is used to select one fader as the master for group starts.

» **Slave** - is used to select one or more faders as Slaves that will follow the action of the fader that has been designated as the Master.

Phone Connection

This section contains the settings for connection to your iQ6 or Telos VX phone system. (Of course, you can also connect your iQ to any stand-alone hybrid by using the inputs and outputs on the QOR.32, but the settings contained in this section function only with iQ6 or VX phone systems.)

Note that the iQ phone source profiles contain settings that are used to specify individual backfeeds and hybrid channels for *all* types of phone systems.

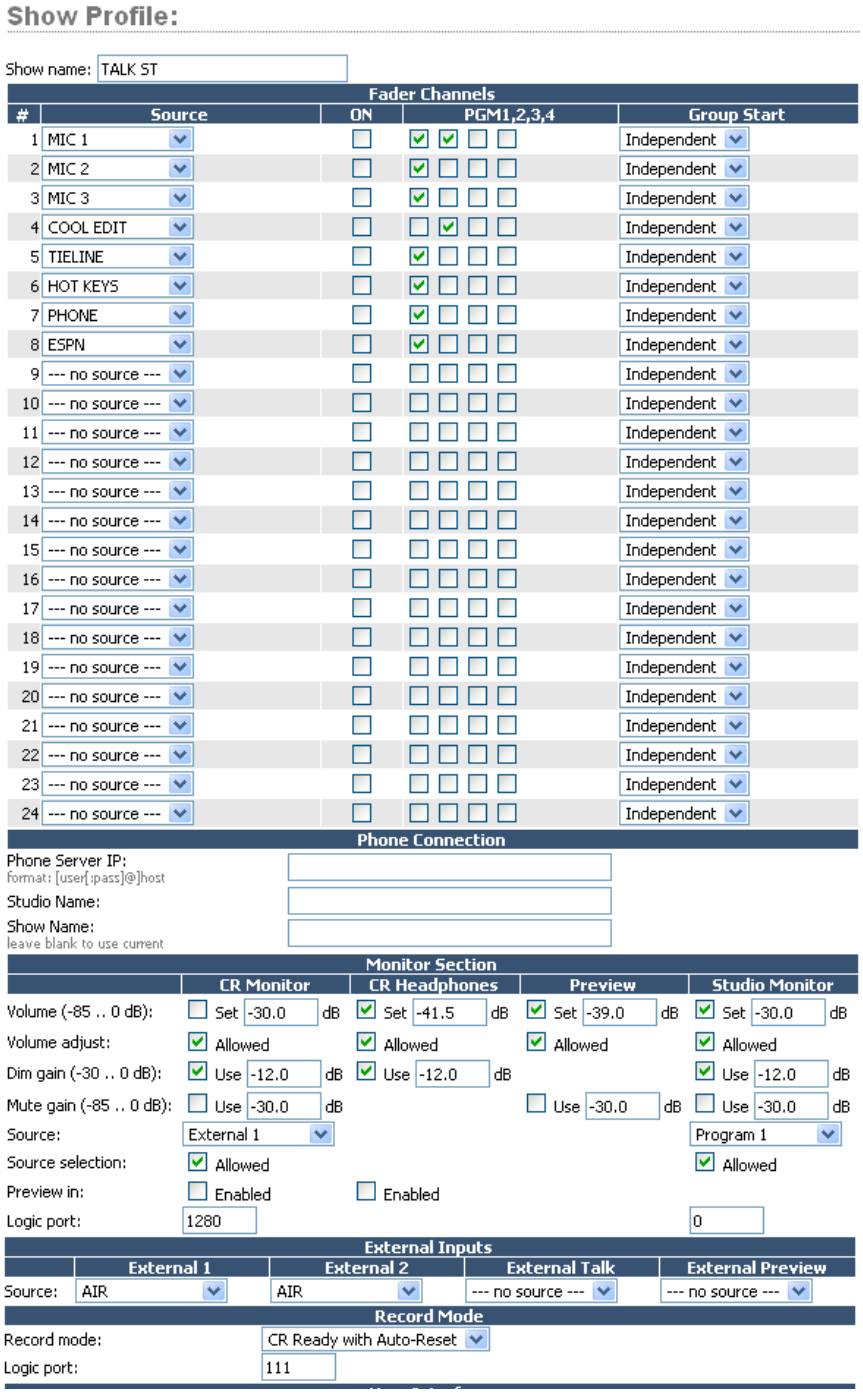
Show Profile:
Show name: TALK ST
Fader Channels
Source ON PGM1,2,3,4 Group Start
1 MIC 1 Independent
2 MIC 2 Independent
3 MIC 3 Independent
4 COOL EDIT Independent
5 TIELINE Independent
6 HOT KEYS Independent
7 PHONE Independent
8 ESPN Independent
9 --- no source --- Independent
10 --- no source --- Independent
11 --- no source --- Independent
12 --- no source --- Independent
13 --- no source --- Independent
14 --- no source --- Independent
15 --- no source --- Independent
16 --- no source --- Independent
17 --- no source --- Independent
18 --- no source --- Independent
19 --- no source --- Independent
20 --- no source --- Independent
21 --- no source --- Independent
22 --- no source --- Independent
23 --- no source --- Independent
24 --- no source --- Independent
Phone Connection
Phone Server IP:
format: [user[:pass]@]host
Studio Name:
Show Name:
leave blank to use current
Monitor Section
CR Monitor CR Headphones Preview Studio Monitor
Volume (-85 .. 0 dB): Set -30.0 dB Set -41.5 dB Set -39.0 dB Set -30.0 dB
Volume adjust: Allowed Allowed Allowed Allowed
Dim gain (-30 .. 0 dB): Use -12.0 dB Use -12.0 dB Use -12.0 dB
Mute gain (-85 .. 0 dB): Use -30.0 dB Use -30.0 dB Use -30.0 dB
Source: External 1 Program 1
Source selection: Allowed Allowed
Preview in: Enabled Enabled
Logic port: 1280 0
External Inputs
External 1 External 2 External Talk External Preview
Source: AIR AIR --- no source --- --- no source ---
Record Mode
Record mode: CR Ready with Auto-Reset
Logic port: 111

Figure 4-2: Show Profile Options

- **Phone Server IP:** Specifies your user name and the IP address of your iQ6 or Telos VX phone server. Log-in information is in the format: **user:pass@ip**. For example, if your VX user name is Marty and your password is "C185", you would enter **Marty:C185@192.168.0.123** where 192.168.0.123 is the IP address of your phone server.
- **Studio Name:** This is your studio name, as configured in the VX system.
- **Show Name:** This can be the same as your iQ show profile for consistency but it must correspond to a **Show Name** configured in your VX phone system. If you leave this blank, the current VX show will remain in use.

Monitor Section

- **Volume (-85..0 dB):** You may specify initial volume settings for the outputs listed below. The default setting is full mute:

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» CR Monitor
» CR Headphones
» Preview
» Studio Monitor

- **Volume Adjust:** This checkbox determines whether you will permit the operator to change the volume settings for the outputs listed below — useful for locking a console into a certain state during unattended operation. "Allowed" is checked by default.
  - » CR Monitor
  - » CR Headphones
  - » Preview
  - » Studio Monitor
- **Dim Gain (-30..0 dB):** You may adjust the Dim Gain independently for CR Monitor, CR Headphones and Studio Monitor. This determines the amount of dimming that will be applied when Talkback is directed to one of these outputs. The default setting is -12.0 dB.
- **Mute Gain (-85..0 dB):** You can specify the amount of attenuation that takes place during a Mute function. The default is full mute. Mute can be applied to CR monitor, Preview and Studio Monitor but it is not applied to CR Headphones.
- **Source:** Selects the default source for CR Monitor and Studio Monitor. Available options are Program 1/2/3/4 and External 1/2.
- **Source Selection:** You may prevent the operator or studio talent from changing their CR Monitor or Studio Monitor source if the corresponding "Allowed" check box is unchecked.
- **Preview In:** determines whether or not Preview will be heard in CR Monitor or CR Headphones in addition to the Preview speaker.
- **Logic Port:** Use this to specify the Livewire channel number assigned to logic ports (GPIO) used for CR Monitor and Studio Monitor functions. These GPIO ports are used for on-air lights and other functions as described in the GPIO tables. Please refer to **Chapter 5: Configuring GPIO** for more details.

External Inputs

- **Source:** Lets you specify two External sources for monitoring purposes plus one source that is an External Preview source. Note that the drop-down selector displays all sources that have been defined as iQ sources in the Source Profile manager.

What's External Preview for? "External" refers here to any source not generated inside the studio you're working in. Let's say you have a Talkback source that you want to feed to the console's Preview speaker. To do this, you would setup a source profile for the Talkback audio and specify that source as External Preview

User Interface

Several global settings are defined in this section. Remember that even though these are general settings, they are specific to each Show Profile so you may accommodate the unique requirements of different shows.

- **Timer Mode:** is used to specify the default timer mode - manual or automatic. In automatic, the timer may be started by turning a channel ON.
- **Preview Interlock Mode:** If **Enable** is checked, pressing any fader's Preview key causes any other, previously-lit Preview key to be extinguished, removing that source from Preview**.** The board operator can assign multiple faders to Preview by pushing and holding any lit Preview key while pushing other Preview keys to add or subtract. If unchecked, each Preview key works like a press-on, press-off latching switch. Multiple faders can be assigned to Preview simply by pushing once; a second push cancels any individual Preview assignment.
- **Switchable Meter Source:** The right half of the second OLED display is a switchable meter. The desired default may be selected from the drop-down menu. Choices are: **Program 4** or **Follow Monitor.**
- **Logic Port for Timer:** Enter the Channel Number of the GPIO port you wish to use for external control of your Count-Up timer.
- **Talk to CR Level: Use** up to -30 dB attenuation or 10 dB gain on the contents of the Talkback bus.
- **Control Lock Map:** This section includes several check boxes. When a box is checked, the selected actions are allowed. Any unchecked boxes will prohibit the operator from accessing these functions when this Show Profile is loaded. The selections are:

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- **Meter Source**
- **Timer Mode**
- **Timer Controls**
- **Record Mode**
- **Talk to backfeeds**
- **Talk to Studio**
- **Preview in HP**

As usual, please remember to hit **Apply** when you are done to save your changes.

Record Mode

Record mode has four options:

- **Disabled (default)**
- **Enabled**
- **CR Ready**
- **CR Ready with Auto Reset.**

These options control the function of the Record key. If any option but Disabled is selected, a unique Livewire channel number must be assigned to the Logic port field.

When enabled, logic follows the Record Device GPIO table found in the GPIO chapter of this manual. CR Ready simply enables the first pin on the logic port when the record button is pressed; CR Ready with Auto Reset does the same, but the pin resets once a microphone is turned on.

External Talk

If the console is installed in a Control Room where the operator will not go "live" with a mic, this option saves you from the need to assign the Operator Mic source type to a fader for Talkback to Codecs or Phones. Assign the appropriate source to External Talk, and with no Operator mic loaded to a channel, the operator can still engage Talk functions to backfeeds.

What's Next?

We have mentioned GPIO many times in the preceding chapters. Join us in Chapter 5 to learn how to interface the logic functions of your iQ console with the real world.

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The ten thousand things

How long do they persist? Gates

and RCA, gone.

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Chapter Five:

Configuring GPIO

Since the days of rotary-switch source selectors, it's been a challenge to properly route machine logic along with audio. Some complicated schemes have been devised over the years, but broadcasters wanted a simple, fast way to associate logic with audio in a routable environment.

Since the Axia IP-Audio system was designed as a true computer network, we were able to start with a clean sheet of paper to design the first truly routable machine logic/audio interface. Unlike conventional logic connections which require each command circuit to be wired individually, Axia sends machine controls over the same Ethernet your audio travels on, further reducing infrastructure, cost and tedium.

Along with controlling external audio devices, iQ GPIO (General Purpose Input/Output) interface also includes logic commands for routine studio/control room operations such as tally lights, monitor muting, On-Air lights and more.

The last chapter explained source profiles and showed you how you can associate GPIO with a source. This chapter explains how to set up iQ GPIO to handle these functions. We also invite you to read the **GPIO Node User's Manual**, for more in-depth information on the topic of GPIO.

> ***Note:*** The iQ console is used with a QOR.32 that includes eight GPIO ports. GPIO ports on stand-alone GPIO nodes or other Axia consoles may also be associated with your iQ sources if your iQ is a part of a larger network. See ***Chapter 7: Livewire Networks and iQ*** for details.

GPIO Port Definitions

The QOR.32 has eight DB-15 connectors on its back panel. Each connector (also known as a GPIO port) can be associated with a device in your studio, and provides five opto-isolated inputs and five opto-isolated outputs per device for machine control, lamp drives and remote channel controls. GPIO ports can also be monitored and controlled by our PathfinderPC software.

GPIO ports are programmed to support several different types of devices. How does a GPIO port "know" which type of device is assigned to it?

Back in **Chapter 2**, when you constructed a Source Profile for a telephone hybrid, you defined the source type (see "Adding Backfeeds and GPIO to a Source Profile"). This is important, because when that source is assigned to a console fader, iQ uses this Source Profile selection to tell the GPIO Node what sort of command to send to the attached device.

If iQ "sees" in the Source Profile that the assigned device is a microphone, it tells the GPIO Node to send logic for **On, Off, Remote Mute** and Remote **Talk** commands on the appropriate pins. If it "sees" a line input, it tells the GPIO Node to send **Start, Stop** and **Reset** commands, plus closures for **Ready** lights, etc.

Axia GPIO ports can deliver unique command sets for the following types of devices:

1. Mic (Operator, Guest, Producer)
2. Line Input
3. Codec
4. Telephone Hybrid
5. Computer Playback Device
6. Control Room Monitor
7. Studio Monitor
8. Profanity Delay Device
9. Recording Device
10. Accessory Button Panel Device

The next few pages contain tables that explain what function the pins provide in each different device mode.

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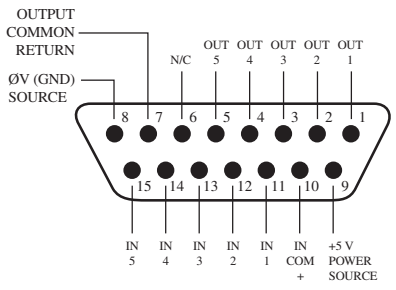
GPIO Operator's Microphone Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turn channel OFF
TALK (to Monitor 2) Command	13	Active Low Input	Activates the TALK TO MON2 function and routes mic audio to the Talkback bus.
MUTE Command	14	Active Low Input	Mutes channel outputs
TALK (to PREVIEWED SOURCE) Command	15	Active Low Input	Activates the TALK button on every source currently in preview and routes mic audio to the Talkback bus.
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON unless TALK or MUTE is active
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF
TALK (to Monitor 2) Lamp	3	Open Collector to Logic Common Return	Illuminates when TALK TO MON2 is active
MUTE Lamp	4	Open Collector to Logic Common Return	Illuminates when MUTE is active
TALK (to PREVIEWED SOURCE) Lamp	5	Open Collector to Logic Common Return	Illuminates when TALK to PREVIEWED SOURCE is active.
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic +5 Volt Supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Input Common	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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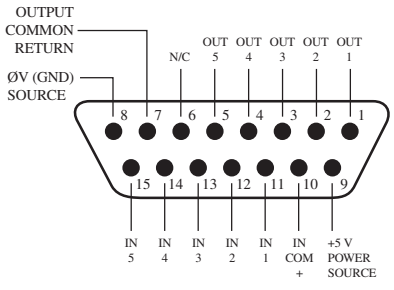
GPIO Control Room Guest Microphone Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turn channel OFF
TALK (to CR) Command	13	Active Low Input	Mutes channel outputs and routes source audio to PVW speakers
MUTE Command	14	Active Low Input	Mutes channel outputs
NOT CONNECTED	15		
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON unless TALK or MUTE is active
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF
TALK (to CR) Lamp	3	Open Collector to Logic Common Return	Illuminates when TALK is active
MUTE Lamp	4	Open Collector to Logic Common Return	Illuminates when MUTE is active
NOT CONNECTED	5		
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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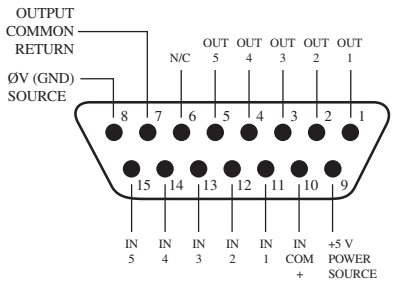
GPIO Studio (Monitor 2) Guest Microphone Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turn channel OFF
TALK (to CR) Command	13	Active Low Input	Mutes channel outputs and routes source audio to PVW speakers
MUTE Command	14	Active Low Input	Mutes channel outputs
NOT CONNECTED	15		
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON unless TALK or MUTE is active
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF
TALK (to CR) Lamp	3	Open Collector to Logic Common Return	Illuminates when TALK is active
MUTE Lamp	4	Open Collector to Logic Common Return	Illuminates when MUTE is active
NOT CONNECTED	5		
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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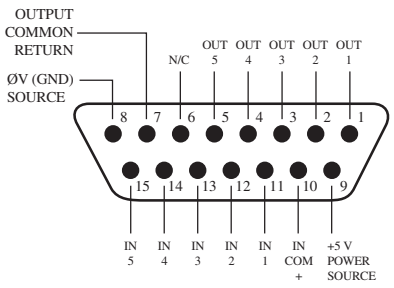
GPIO Producer's Microphone Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turn channel OFF
TALK (to MONITOR 2) Command	13	Active Low Input	Activates the TALK to MON2 function and routes mic audio to the Talkback bus.
MUTE Command	14	Active Low Input	Mutes channel outputs
TALK (to PREVIEWED SOURCE) Command	15	Active Low Input	Activates the TALK button on every source currently in Preview and routes mic audio to the Talkback bus.
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON unless TALK or MUTE is active
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF
TALK (to MONITOR 2) Lamp	3	Open Collector to Logic Common Return	Illuminates when TALK to MON2 is active.
MUTE Lamp	4	Open Collector to Logic Common Return	Illuminates when MUTE is active
TALK (to PREVIEWED SOURCE) Lamp	5	Open Collector to Logic Common Return	Illuminates when TALK to PREVIEWED SOURCE is active.
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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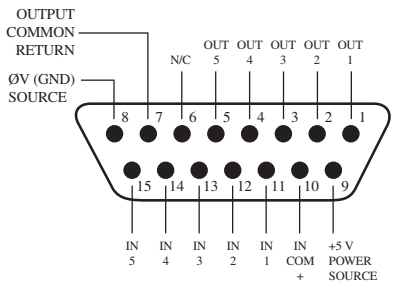
GPIO Line Input Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turns channel OFF & sends 100 msec STOP pulse
PREVIEW Command	13	Active Low Input	Turns preview ON
RESET Command	14	Active Low Input	Turns channel OFF, while not sending a STOP pulse
READY Command	15	Active Low Input	Illuminates OFF lamp to indicate source's readiness
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF and READY is active
PREVIEW Lamp	3	Open Collector to Logic Common Return	Illuminates when PREVIEW is ON
START Pulse	4	Open Collector to Logic Common Return	A 100 msec pulse when the channel status changes from OFF to ON
STOP Pulse	5	Open Collector to Logic Common Return	A 100 msec pulse when the channel status changes from ON to OFF
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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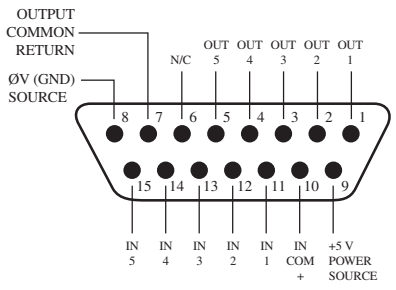
GPIO Codec Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turns channel OFF
TALK (to CR) Command	13	Active Low Input	Mutes channel outputs and routes source audio to PVW speakers
MUTE Command	14	Active Low Input	Mutes channel outputs
TALK (to SOURCE) Command	15	Active Low Input	Allows an external button to activate channel TALK TO SOURCE function.
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON unless TALK or MUTE are active
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF.
TALK (to CR) Lamp	3	Open Collector to Logic Common Return	Illuminates when TALK is active
MUTE Lamp	4	Open Collector to Logic Common Return	Illuminates when MUTE is active
TALK (to SOURCE) Lamp	5	Open Collector to Logic Common Return	Illuminates when the channel TALK TO SOURCE function is active.
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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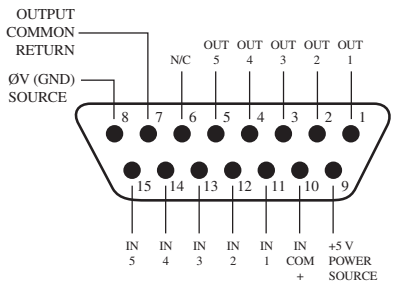
GPIO Telephone Hybrid Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turns channel OFF
PREVIEW Command	13	Active Low Input	Turns preview ON
RESET Command	14	Active Low Input	Turns channel off while not sending a STOP pulse
READY Command	15	Active Low Input	Illuminates OFF lamp to indicate source's readiness
OUTPUTS			
ON Lamp	1	Open Collector to Logic Common Return	Illuminates when channel is ON
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF
PREVIEW Lamp	3	Open Collector to Logic Common Return	Illuminates when PREVIEW is ON
START Pulse	4	Open Collector to Logic Common Return	A 100 ms PULSE is sent when channel is first turned ON or when PVW is first selected
STOP Pulse	5	Open Collector to Logic Common Return	A 100 ms PULSE sent when channel is turned OFF.
POWER & COMMAND			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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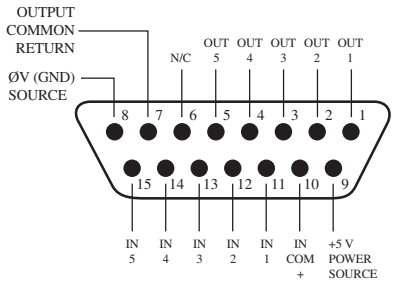
GPIO Control Room Monitor Logic

Name	Pin	Type	Notes
INPUTS			
MUTE CR Command	11	Active Low Input	Mutes CR monitors and Preview speakers
DIM CR Command	12	Active Low Input	Allows external dimming of CR monitor speakers.
Enable EXT PREVIEW Command	13	Active Low Input	Feeds External Audio Input to PREVIEW
TALK TO EXT Command	14	Active Low Input	Turns on Talk to External Audio.
Not used.	15	Active Low Input	
OUTPUTS			
CR ON AIR Lamp	1	Open Collector to Logic Common Return	Illuminates whenever CR monitors are muted
DIM CR Lamp	2	Open Collector to Logic Common Return	Illuminates whenever control room monitors are DIMMED
PREVIEW Lamp	3	Open Collector to Logic Common Return	Illuminates when PREVIEW is active.
TALK TO EXT Lamp	4	Open Collector to Logic Common Return	Illuminates when Talk to External is active.
TALK (to CR) Active Lamp	5	Open Collector to Logic Common Return	Active whenever a source has activated its TALK (to CR) function
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



GPIO v."ZA" 4/2009

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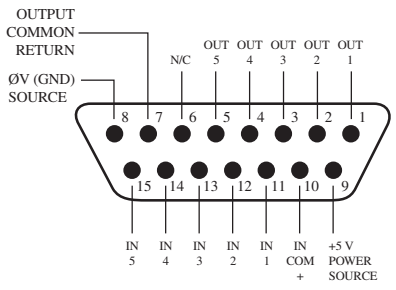
GPIO Studio Monitor Logic

Name	Pin	Type	Notes
INPUTS			
MUTE Studio Command	11	Active Low Input	Allows external muting of Studio monitor speakers.
DIM Studio/Monitor 2 Command	12	Active Low Input	Allows external dimming of Studio monitor speakers.
Remote Event Timer Trigger Command	13	Active Low Input	Resets Count-up Event Timer to zero and starts timer.
NOT CONNECTED	14		
Not Used	15	Active Low Input	
OUTPUTS			
Studio ON AIR Lamp	1	Open Collector to Logic Common Return	Illuminates whenever Studio monitors are muted
DIM Studio/Monitor 2 Lamp	2	Open Collector to Logic Common Return	Illuminates whenever Studio monitors are DIMMED
Event Timer Trigger Output	3	Open Collector to Logic Common Return	A 100 ms PULSE sent when event timer is started from zero.
NOT CONNECTED	4		
TALK TO STUDIO/MONITOR 2 Active Lamp	5	Open Collector to Logic Common Return	Illuminates whenever the TALK TO STUDIO/MON2 function is active.
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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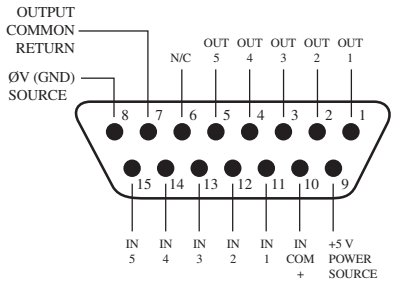
GPIO Computer Playback Device Logic

Name	Pin	Type	Notes
INPUTS			
ON Command	11	Active Low Input	Turns channel ON
OFF Command	12	Active Low Input	Turns channel OFF & sends 100 msec STOP pulse
PREVIEW Command	13	Active Low Input	Turns preview ON
Not Used	14	Active Low Input	
READY Command	15	Active Low Input	Illuminates OFF lamp to indicate source's readiness
OUTPUTS			
NEXT Pulse	1	Open Collector to Logic Common Return	A 100 mS PULSE sent when ON button is depressed, except when initially turned ON.
OFF Lamp	2	Open Collector to Logic Common Return	Illuminates when channel is OFF and READY is active
PREVIEW Lamp	3	Open Collector to Logic Common Return	Illuminates when PREVIEW is ON
START Pulse	4	Open Collector to Logic Common Return	A 100 ms PULSE sent when channel is first turned ON.
STOP Pulse	5	Open Collector to Logic Common Return	A 100 ms PULSE sent when channel is turned OFF.
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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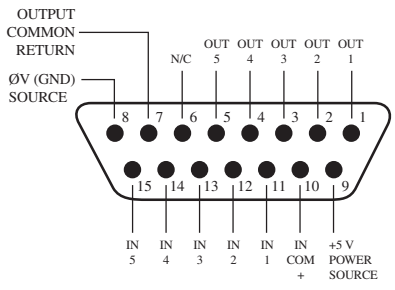
GPIO Film Legendable User Button Module / Accessory Panel / Rack Panel

Name	Pin	Type	Notes
INPUTS			
User Button 1 Lamp	11	Active Low Input	Illuminates User Button 1 Lamp
User Button 2 Lamp	12	Active Low Input	Illuminates User Button 2 Lamp
User Button 3 Lamp	13	Active Low Input	Illuminates User Button 3 Lamp
User Button 4 Lamp	14	Active Low Input	Illuminates User Button 4 Lamp
User Button 5 Lamp	15	Active Low Input	Illuminates User Button 5 Lamp
OUTPUTS			
User Button 1 Switch	1	Open Collector to Logic Common Return	Active when User Button 1 is pushed
User Button 2 Switch	2	Open Collector to Logic Common Return	Active when User Button 2 is pushed
User Button 3 Switch	3	Open Collector to Logic Common Return	Active when User Button 3 is pushed
User Button 4 Switch	4	Open Collector to Logic Common Return	Active when User Button 4 is pushed
User Button5 Switch	5	Open Collector to Logic Common Return	Active when User Button 5 is pushed
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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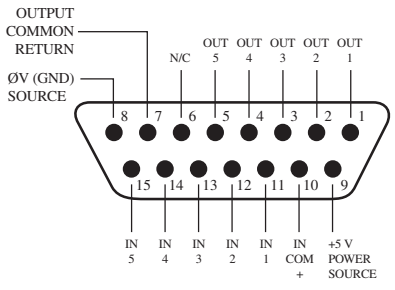
GPIO Recording Device Logic

Name	Pin	Type	Notes
INPUTS			
Not Used	11	Active Low Input	
Not Used	12	Active Low Input	
Not Used	13	Active Low Input	
Not Used	14	Active Low Input	
Not Used	15	Active Low Input	
OUTPUTS			
Rec ON Lamp	1	Open Collector to Logic Common Return	Active whenever Record Mode is engaged.
Rec OFF Lamp	2	Open Collector to Logic Common Return	Active whenever Record Mode is NOT engaged.
Not used	3	Open Collector to Logic Common Return	n/a
START Pulse	4	Open Collector to Logic Common Return	A 100 mS PULSE sent when Record Mode is engaged.
STOP Pulse	5	Open Collector to Logic Common Return	A 100 mS PULSE sent when Record Mode is disengaged.
POWER & COMMON			
Source Common	7	Logic Common	Connect to ground of source device or to Pin 8
Logic Common	8	Internal 5 Volt return	Can be connected to Pin 7 if source is not providing common
Logic + 5 Volt supply	9	Logic Supply, Individually Fused	Can be connected to Pin 10 if source is not providing voltage; active only when source has been assigned to channel.
Source Supply	10	Common for all 5 inputs	Connect to power supply of source device or to Pin 9
NOT CONNECTED	6		



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Assigning GPIO to a Source

As you've seen by studying the previous pages, a lot of the work of assigning logic to a source is done for you; once a GPIO port is linked with a Source Profile, all that remains to do is to solder cables connecting the GPIO's DB-15 connectors to the device's control interface.

So, how *do* you link a GPIO port with a Source Profile? It's very easy; let's do it step-by-step.

> ***Note:*** This procedure assumes that you have already defined at least one Source Profile using the instructions outlined in Chapter 2.

1. Open your Web browser and enter the IP address of your console. Choose **GPIO Configuration** from menu. Enter your password if prompted (default login is "user", leave the password field blank).

2. If you haven't previously assigned any GPIO ports, the GPIO definitions screen will be blank. Notice the status indicators at the top of the page, showing the state of the input and output pins of each port. The "Logic for" option defines how the port will be used.
   - » **LWRP:** The port will only be controlled through a control protocol. Software packages, as in Pathfinder use the protocol.
   - » **LIVEWIRE:** Specify a channel number and the port will follow the logic associated with that channel (this will be used for CR monitor logic)
   - » **SPECIFIED INPUT:** Define an input port and the port will follow the logic of that input.

Local GPIO Configuration:

#	Name	Logic for	Livewire Channel
1	ON AIR	LWRP	0
2	RECORD	Livewire	3111
3	PHONE	Analog 5	0
4	GPIO 4	Analog 7	0
5	AV play1	Livewire	999
6	GPIO 6	AES/EBU 1	0
7	GPIO 7	Livewire	111
8	GPIO 8	LWRP	0

Figure 5-1: GPIO Port Assignment

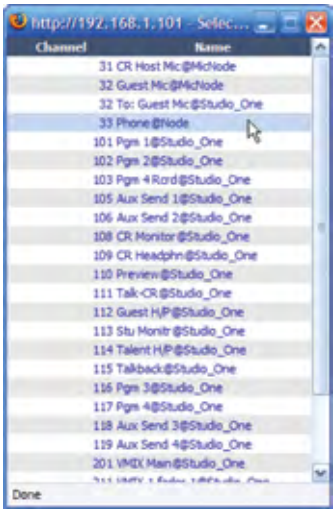

Figure 5-2: GPIO Select Source popup list

3. If using the **LIVEWIRE** option, you will need to specify the Channel Number in the **Livewire Channel** column. You can do this by manually entering the number, or browsing the network for an advertised Livewire channel. When you click on any list icon, a small popup window will open, enumerating all of the audio sources available on the Livewire network (Figure 5-2). Choose the source you wish to associate with a GPIO port by clicking on it; the window will close and the source's name and channel number will appear in the **Channel** box.

If you're using a local source, specify the input. If a source profile has been created to control a phone hybrid using Analog 5 as the input, select Analog 5 in the drop down list. The functions of the GPIO port will now follow those shown in the Hybrid Logic Chart.

4. Type a descriptive name in the **Name** field, and click on the **Apply** button.

5. The source we've been using for this demonstration is a telephone hybrid; we can now observe the pin status indicators change as we turn the chan-

Figure 5-3: Pin status indicators showing GPIO port activity

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nel on and off, as shown in Figure 5-3.

Referring to the Hybrid Logic Chart, we can see that when the iQ channel is **Off**, the indicator representing Output Pin 2 – the **Off Lamp** logic command – is high. Turning the channel **On**, we see Pin 4 pulse briefly before Pin 1 goes high: the GPIO has just sent a **Start** pulse, then lit the **On** Lamp. If you turn the channel **Off** again, you'll observe a **Stop** pulse, and the **Off Lamp** command once again becomes active.

See how easy that was? Simply assigning an existing audio source to a GPIO port automagically configures the port for the type of device supplying the audio, and send the appropriate logic commands to that port when the source is assigned to a iQ channel.

Connections to GPIO Ports

Input Connections

Current on these inputs must be limited to 20 mA or less, through the use of a current-limiting resistor. An external power source (24 volts DC maximum) is recommended for all inputs and outputs, to prevent ground loops between equipment. However, if customer equipment is completely isolated, using power from the GPIO port connectors is acceptable. Figure 5-4 shows details for both types of connections:

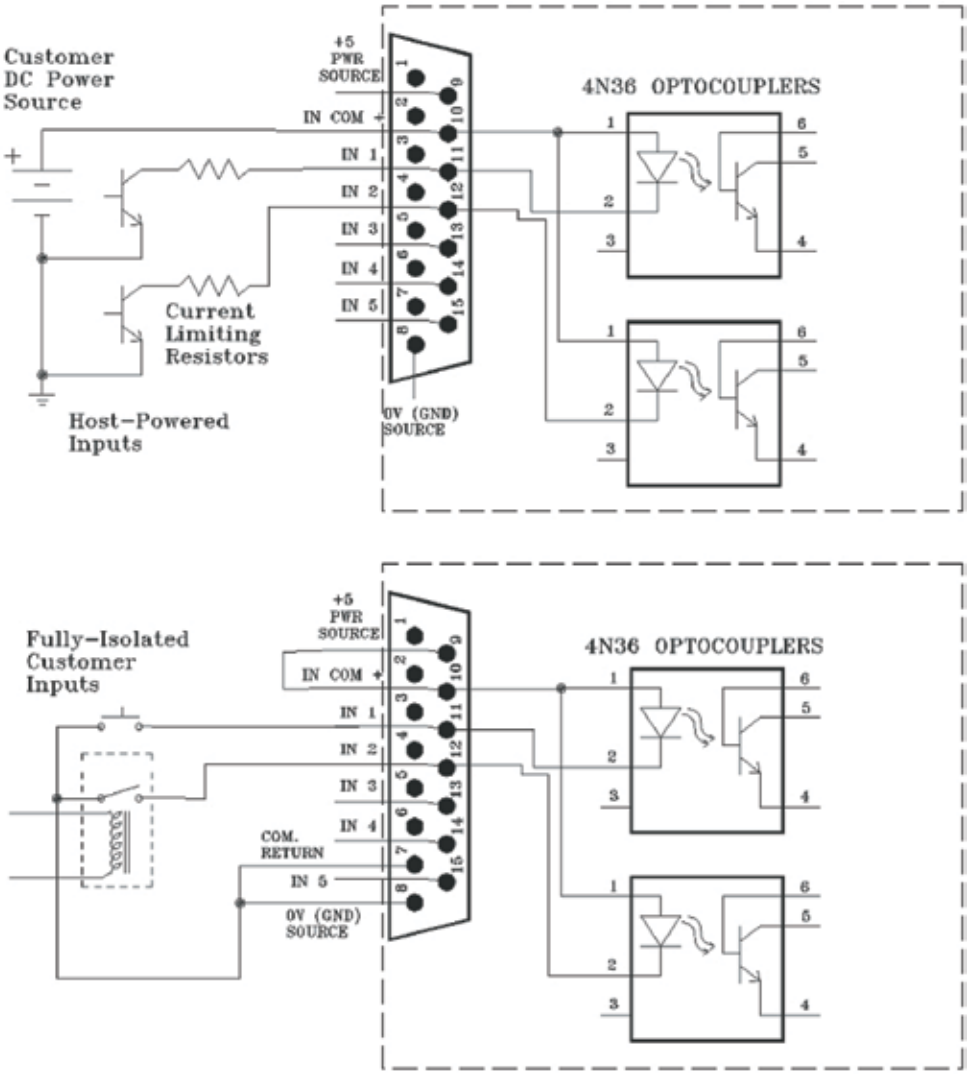

Figure 5-4 GPIO input connections

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Output Connections

The GPIO port's outputs are opto-isolated. Current should be limited 100 mA through each output, with the total current draw from the +5 Volt supply not to exceed 3 amps. Figure 5-5 shows the recommended connections for outputs:

NOTE: Some external devices will allow a logic control input "sink to ground" to activate. Thus, some devices may not work with an Axia GPO control, because they may not fully achieve ground through the output transistor. The voltage drop between the collector and emitter may not be low enough to activate the device, so an external relay controlled by the GPO may need to be used to provide a "dry" contact closure to the external device.

Please note that this section is provided as a "jump-start" introduction to Axia GPIO nodes. For a fuller understanding of the GPIO node's options and requirements, you may wish to read the GPIO Node User's Manual.

Virtual GPIO

Virtual GPIO ports allow you to to avoid having to wire a GPO pin to a GPI pin in order to achieve a particular function. The Virtual GPIO ports provide an ability to define up to five GPO pins that can be "virtually wired" to a single GPI pin. Typically this is used in cases where you want a GPO function to trigger a different GPI function. Please refer to the GPIO tables to determine what those functions are.

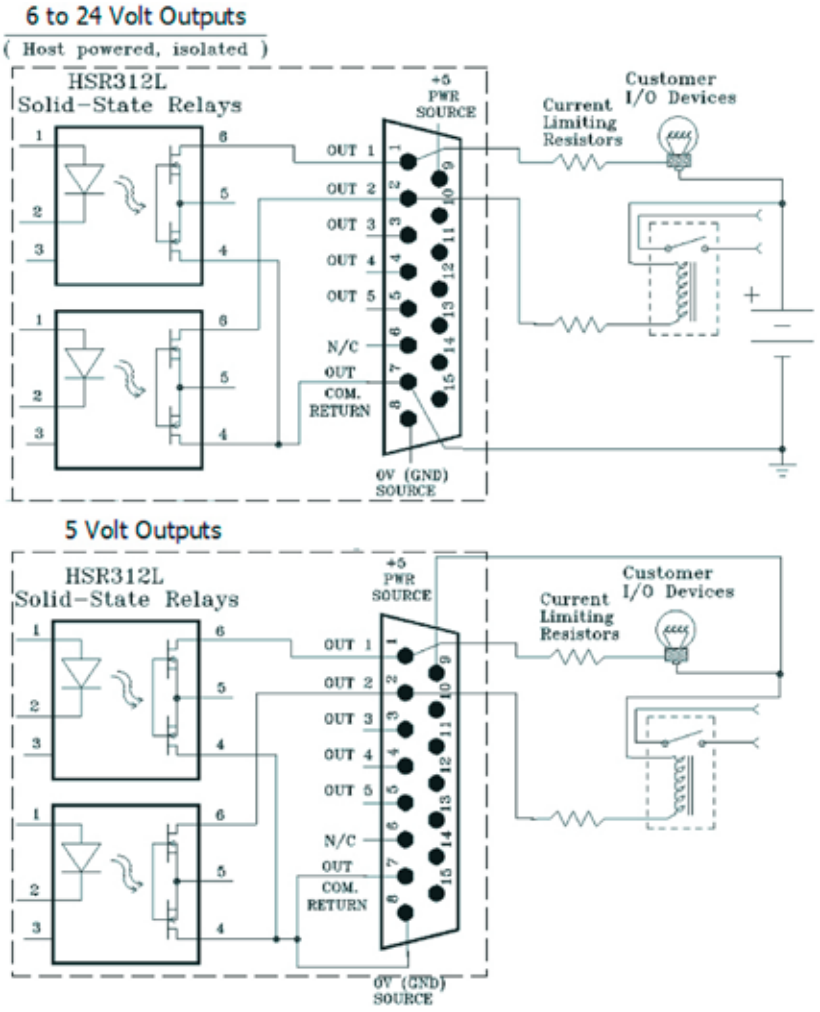

Figure 5-5: GPIO output connections

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An example of this sort of "virtual GPIO" operation is triggering the TALK TO EXT command and EXT PREVIEW command of the CR Monitor logic.

Configuring and using iQ User Keys

The 6 Fader + User Keys iQ expansion module provides two sets of 5 programmable "user keys." You'll use the iQ Control Center's Console Configuration page to configure ports for these keys to use.

When you've defined one of the expansion console units as "Console Ext 6", you'll find a section marked "User Buttons" that you'll use to configure the functions

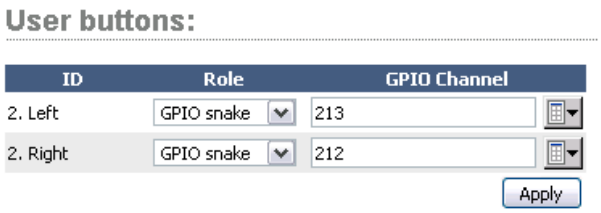

Figure 5-6: User Buttons configuration options

of these keys.

- The **ID** column identifies the User Keys from top to bottom, and in the left and right columns.
- The **GPIO Channel** box (and the adjacent selector boxes) allow you to assign a Livewire GPIO Channel number to each User Key.
- The **Role** drop-down selector has two choices:
  - » **GPIO Snake**: Choose this option when you want a button-press to result in a GPO response at the GPIO port assigned to the GPIO Channel you've specified.
  - » **GPIO module:** Choose this option when you want a button-press to be interpreted as a GPI command at the GPIO port you've assigned to the GPIO Channel. Also, if the GPIO Channel has a GPO message issued on the network, the corresponding button will light, indicating "ready."

What's Next

When you're ready, join us in Chapter 6 for a comprehensive "under the hood" discussion of iQ Advanced Controls.

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In the future, all

radio equipment will

be networked. Oh, wait!

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Chapter Six:

Advanced Controls

In previous chapters, we covered the basics of setting up your iQ. Now that you're familiar with your console, you should consider yourself an advanced user! In keeping with your dawning guru status, it's time for a thorough look at some of iQ's more advanced configuration options.

Many of iQ's features can be customized by software settings. And owners like you have given us great ideas for new operational capabilities, some of which are included in our periodic software updates. With that in mind, we strive to keep our documentation as up-to-date as possible.

If you have questions that are not covered here, we invite you to contact our 24/7 Support crew:

- by email at support@AxiaAudio.com
- by phone at +1 216-241-7225.

iQ Configuration Screens

The iQ Control Center

Figure 6-1 shows the screen that greets you when you log into your iQ from your Web browser. The main menu runs down the left side and gives access to options and settings. In the main window you can see at a glance what version of iQ software is loaded, system information, CPU statistics, and more. For diagnostic purposes, this information screen is openly accessible, but clicking on any menu heading will prompt you for a password. Here you'll find options related to the QOR.32, iO Fader Frames and Ethernet switch.

The Status Screen

The Status screen is your home page. It displays basic system status as well as information pertaining to the active software load. A sample of this screen is shown in figure 6-1. Additional information displayed may include::

Figure 6-1: Status Screen

- iQ software version info including the current active Version and Base
- System Information including:
  - » Version of Linux kernel
  - » Uptime of the iQ expressed in days, hours and minutes
  - » CPU utilization
  - » Network Information
  - » Network status and utilization - transmit and receive data rates expressed in Mbps.
  - » Debug information
- File System Information - provides information on memory and solid state disk utilization for the operating system. This information may be requested by Axia tech support.

The Setup Menu

We touched briefly on the IP features of the Setup screen in Chapters 1 and 2. Now let's look at the rest of the tools on this page shown in Figure 6-2.

- **Network Configuration** contains the fields for the iQ IP Address and other network functions.
  - » **Hostname** is the unique name you give the console to identify it in the Web interface. You might want to name it after the studio it's in.

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» **IP Address:** This is the network address of your iQ. We suggest that you have a plan to ensure that all of your Livewire devices are assigned unique, IP addresses.

Shortcut Key: You can also set the IP address of your iQ by simultaneously pressing and holding the **Meter** and **Clock** keys on the iQ Console. Use the Studio Monitor knob to navigate and follow the prompts to give your iQ a new IP address.

» **Netmask:** Enter your network's submask here. If you are not sure about this - consult your network administrator. In most cases a Netmask of 255.255.255.0 is suitable.

» **Gateway:** If you have a Core switch or a network gateway to allow access from outside your facility, enter that address here. A gateway is required for advanced IP address configurations and for connection to an external NTP server.

Note: A reboot is required when any changes are made to the network parameters on the iQ Setup Menu.

Figure 6-2: Setup Screen

- **Web Access Password:** By default, the user name is set to "user" and the password is blank. If you want to add a password, type it in both boxes and click **Change.** Note that passwords will not display here once changed, so be sure to make a record of all password changes.

- **Software Update:** This is where you upload new iQ operating software.
  - » **Software Versions** shows you the software packages currently stored on your iQ flash memory card. The blue radio button is displayed next to the active software image.
  - » **Change Active Bank:** When you want to change the active software package, click on the radio button next to the image you wish to activate, and click this button. A reboot is necessary to load the new software choice.
  - » **Upload Image:** From time to time, Axia makes new software packages available for download from AxiaAudio.com/downloads/. Use the **Browse** and **Upload Image** buttons to install new software, as described in the Technical Bulletin that accompanies each software release. Note that uploading a new image will always over-write the inactive bank.
  - » **Reboot** shuts down iQ and restarts it. A reboot is required after changing active software or after changing any settings in your Network Configuration.

Save your work! We recommend backing up your Configuration files whenever a major change is made, or is about to be made, to your iQ. Whether you are re-configuring Show or Source profiles *en masse* or about to perform a software update, it's always a good idea to have a copy of your important data.

The Customize Menu

The **Customize** page contains Clock settings and Backup/Restore functions. Future enhancements may include additional features in this area.

- **Clock Options**
  - » **Clock Format:** This is where you define whether you will view your time in 12 hour or 24 hour format.

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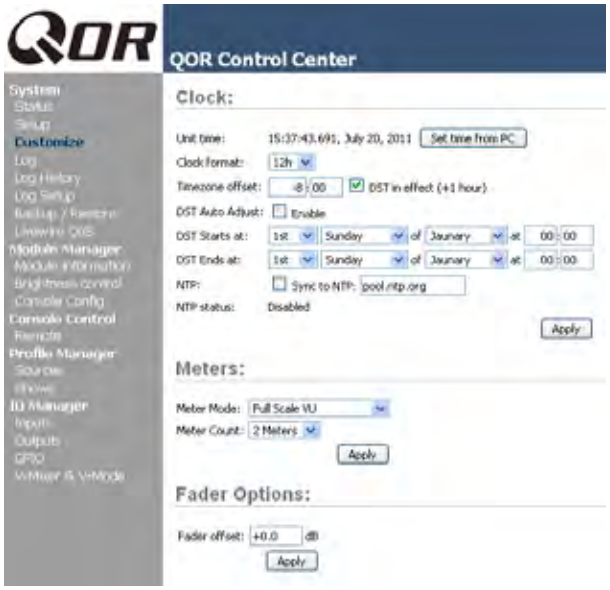

Figure 6-3: Customize Screen

Each individual IQ in your network can use either its own internal clock or an external time server for timekeeping. The next group of settings will set up NTP (Network Time Protocol) time sync.

» **Time Zone Offset:** Specify your local GMT offset in hours and minutes. For example, if you live in the Eastern Tome zone in the USA, your GMT offset will be -5 hours, 0 minutes. If you live in Riga, Latvia, your offset will be +2 hours.

» **DST in effect (+1 hour):** In those area that implement Daylight Savings Time, this check box is used to tell your system to add one hour to the GMT offset.

» **NTP:** The check box should be checked if your iQ's NTP clock sync function is enabled. To disable NTP service, simply un-check this box. The other box here is used to enter the IP address of your external NTP server. This server may be a PC on your local network or it may be the IP address of a public NTP server in the Internet. Note that you must specify an IP address – a URL will not work.

If you wish to connect to a public or external NTP server, be sure to specify a valid Gateway in your IP configuration.

You can tell if your NTP connection is working by observing the presence of the NTP indicator next to the clock display on your iQ overbridge.

- **Connfiguration:** This is an extremely important area of your iQ configuration since this is where you will backup all of the hard work you have done.
  - » **Backup Settings:** All iQ settings can be saved in a single operation and backed up to a location on your local drive. When you select the **Backup** option, you will see the familiar location navigator that prompts you for the folder in which you wish to store your backup file. The backup file will be named according to the device name, IP address and date/time the backup was performed. This naming conventions allows you to store multiple backups from multiple devices in the same location. An example of an IQ backup's file name might be **IQ-192.168.0.200-2010-03-25_17-13.xml.**
  - » **Restore Settings:** To restore a previous iQ backup, use the browse button to locate the backup and then select **Restore.**

Log, Log History and Log Setup Menus

iQ keeps a detailed log of user actions and other system events. Choosing the **Log** menu item lets you examine the last 100 logged activities; choosing the **Log History** menu item allows you to view an entire day's log at one time and delete old log files if you choose. The oldest log files are deleted automatically as storage space dictates.

The **Log Setup** menu item allows you to specify an external Syslog server and to configure the debug level. This menu also allows you to specify from eight different severity level filters. The filter choices (in order of decreasing severity) are:

- Emergency: system us unusable
- Alert: action must be taken immediately
- Critical: critical condition
- Error: error conditions
- Warning: warning conditions
- Notice: normal but significant condition
- Informational: informational messages
- Debug: debug level messages

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Use this section as directed to do so by Tech Support.

The Module Manager

The **Module Manager** heading displays information about the iQ Main Frame as well as all other modules (fader frames) and accessories connected to your CANBus ports. Some of these fields are for diagnostics; below is a list of those you might find useful:

- **Address:** displays the number Axia has assigned to each connected unit.
- **Type:** gives you the working name of the module.
- **State:** tells you whether or not the module is working, i.e., communicating with the Core CPU.
- **Ping**: Indicated ping response in ms.
- **Messages, Idle Time, Uptime:** All indicate diagnostic information that is related to the CANBus communications. Tech support may request this information for troubleshooting purposes.
- **Hardware Revision:** displays the hardware version of the iQ module.
- **Firmware Version:** displays the firmware version that's loaded on the iQ module.
- **Upload Firmware Group:** From time to time, new module firmware may become available from Axia. You may install new firmware by choosing Browse and then Upload.

NOTE: Updating a module takes it offline during the update process. While audio playing through the module's faders will continue uninterrupted, keep in mind that while updating (usually about 10-15 seconds) you will not be able to adjust gain or turn faders on or off on the module being updated.

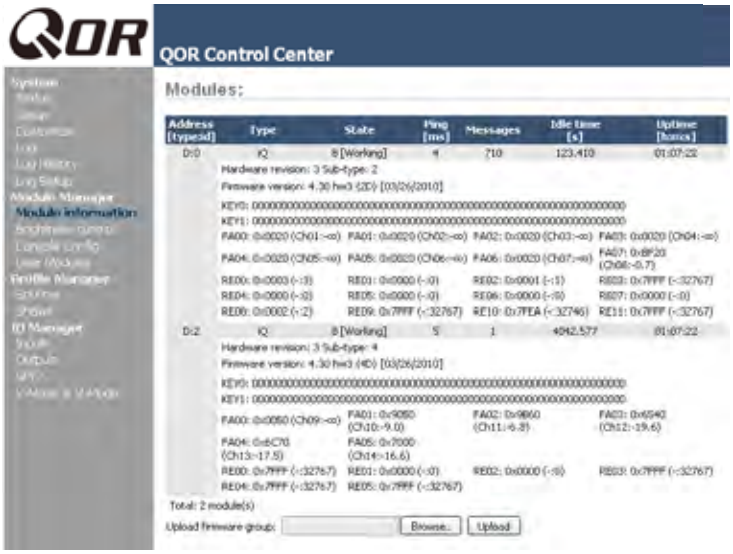

Figure 6-4: Modules Manager

Brightness Control Menu

This menu offers several options for fine-tuning your iQ displays to your studio's ambient lighting. All values are expressed in percent. The default setting will be suitable for most studio environments, however you may make adjustments as needed.

User Modules Menu

This menu allows you to set up and use Axia accessory SmartSwitch and Film-Cap Button modules and accessory panels with your console. This area is where you will find settings for the 10 User Keys found on the 6-fader Frame. Axia PathfinderPC software is used to provide powerful logic functions controlled by these keys.

GPIO Configuration Menu

This menu is where you configure the assignments for the four opto-isolated GPIO connections found on the rear panel of the QOR.32. For a thorough discussion of this screen and how to configure GPIO, please refer to **Chapter 5: Configuring GPIO**.

Remote

The remote function available through the web interface gives you many of the same controls that are on the surface:

- You have the option to load a Show profile by selecting the show in the dropdown selector, and then pressing the **Load** button.
- You can activate the Record mode.
- Each fader channel is shown with an option to change the source, change the ON state, assignments to the four mixes, and Preview state.

In order to change a state, you must make the selection to the channel and press the **Apply** button for that row. This is control of a single channel at a time. Below the Fader Chan-

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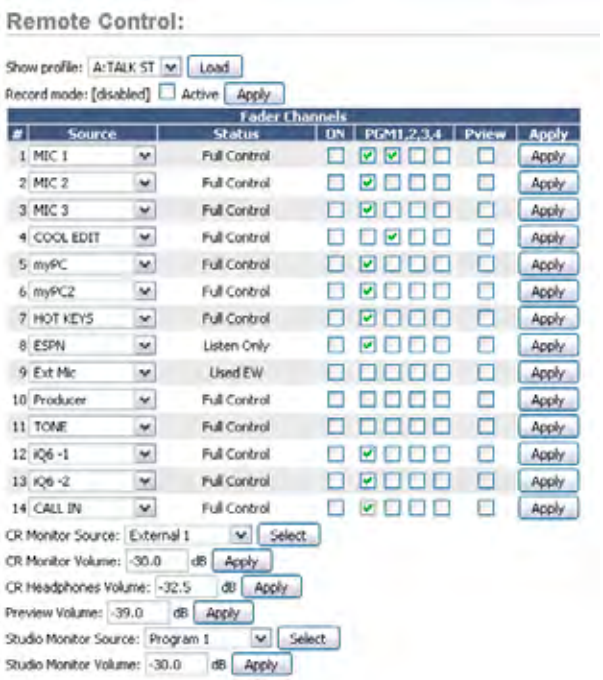
Remote Control:
Show profile: A:TALK ST Load
Record mode: [disabled] Active Apply
Fader Channels
Source Status ON PGM1,2,3,4 Pview Apply
1 MIC 1 Full Control Apply
2 MIC 2 Full Control Apply
3 MIC 3 Full Control Apply
4 COOL EDIT Full Control Apply
5 myPC Full Control Apply
6 myPC2 Full Control Apply
7 HOT KEYS Full Control Apply
8 ESPN Listen Only Apply
9 Ext Mic Used EW Apply
10 Producer Full Control Apply
11 TONE Full Control Apply
12 iQ6 -1 Full Control Apply
13 iQ6 -2 Full Control Apply
14 CALL IN Full Control Apply
CR Monitor Source: External 1 Select
CR Monitor Volume: -30.0 dB Apply
CR Headphones Volume: -32.5 dB Apply
Preview Volume: -39.0 dB Apply
Studio Monitor Source: Program 1 Select
Studio Monitor Volume: -30.0 dB Apply

Figure 6-5: Remote Screen

nels section are the controls for the monitors, where the source and volumes for a monitor can be adjusted.

Profile Manager Menu

These menus allow you to construct and administer Show and Source Profiles specific to this iQ console. Refer to **Chapter 2: Inputs and Outputs** and **Chapter 4: Show Profiles** for details on Source and Show profiles.

IO Manager Menu

These menus allow you to administer your iQ's audio Inputs and Outputs. Refer to **Chapter 2: Inputs and Outputs** for complete details on configuration of these controls.

Ethernet Switch settings (Preconfigured)

QOR.32 contains an integrated Ethernet switch. This switch manages the multicast functions of the console and enables it to be connected to other devices via your managed Livewire LAN.

NOTE: We make every effort to keep our manuals up-to-date, but sometimes R&D works quicker than our documentation elves! Controls documented in this section may vary from those actually presented on your product. Please contact support@AxiaAudio.com for explanations of any differences you may find.

What's Next

iQ is designed to be the perfect standalone IP console. But what if you want to use your iQ as part of a larger Livewire studio network? No problem! Read on as we configure networking options for your iQ.

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Dark, dark as coal tar

it pours out, bitter and strong.

That's Starbucks for you.

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Chapter Seven:

Networking with iQ

iQ is a superb standalone broadcast console — but that's just half the story! Like all Axia broadcast products, iQ has networking capabilities as well.

Axia invented networked audio for broadcast. We call it Livewire, and iQ uses this networking ability in several different ways:

- Your iQ console can load and utilize sources from other studios connected to your Livewire network.
- You may deliver outputs from your iQ to the Livewire network for use by others.
- Naturally, iQ can also use GPIO logic that is available on your Livewire network.
- The Livewire network allows you to use our companion software package, PathfinderPC, for numerous advanced functions. The list of features provided by PathfinderPC is growing continuously.
- Up to four iQ consoles can be configured daisy-chain style, without the need for an external core Ethernet switch, to take advantage of network redundancy provided by implementation of the Spanning Tree Protocol (STP) standard.
- You can manage your iQ remotely using its web browser interface.
- Configuration backup and restore operations may be performed over the network as well.

For an in-depth discussion of Livewire, please review our publication "**Introduction to Livewire: IP-Audio System Design Reference and Primer,**" which provides an excellent discussion of IP-Audio and how standard Ethernet can be used to transport real-time broadcast audio in a studio environment. This publication is available at AxiaAudio.com/manuals/.

Inputs

Congratulations — your iQ console is the world's first broadcast mixer with a custom, built-for-broadcast Ethernet switch built right in!

When properly configured and connected to other iQ consoles (or, in a large studio facility, to an Ethernet "core" switch), this network connection permits you to access the resources of other devices connected to your network.

iQ has a "gateway" for exchanging audio data with the rest of your Livewire network, with two modes of operation.

In the first mode, iQ can consume up to 12 Livewire audio streams *from* the network, and it can deliver 4 Livewire audio streams *to* the network.

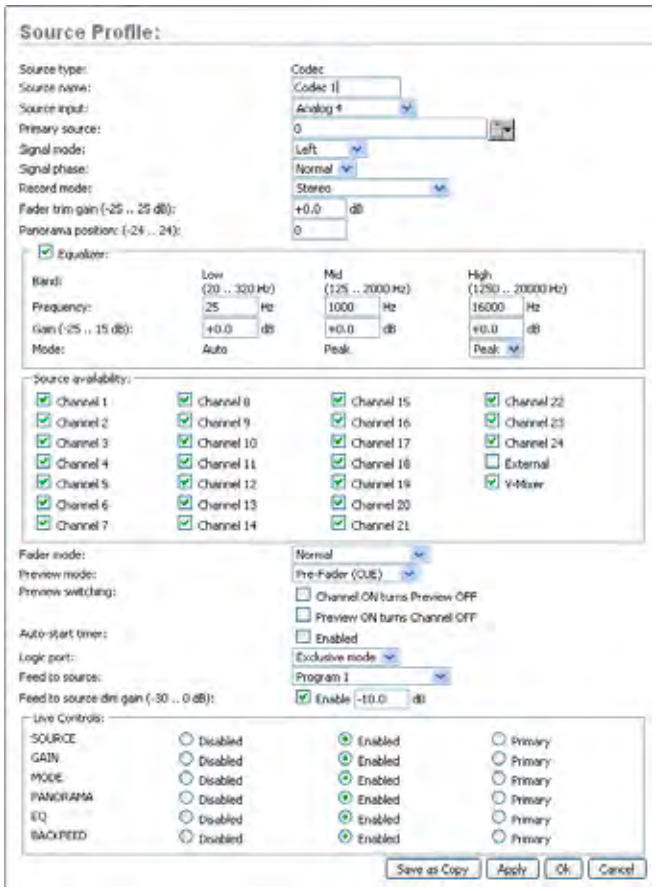

Figure 7-1: Codec Source

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In the second mode, iQ can consume up to 8 Livewire audio streams *from* the network, and it can deliver 8 Livewire audio streams *to* the network.

To understand this, it might help to envision this network connection as a high-speed freeway, with 8 or 12 "lanes" coming *towards* your studio, and 8, or 4, lanes going *away* from your studio, to the network.

To select the mode you wish to operate in, point your browser to the "Customize" page in the QOR Control Center, and use the "Livewire Mode" option to select either "8 in, 8 out" or "12 in, 4 out."

Figure 7-2: Livewire Outputs

Selecting the Source Input

In **Chapter 2: iQ Inputs and Outputs**, we discussed the iQ console's local inputs - those associated with the XLR and RJ-45 connectors on the rear panel of the QOR.32. We saw how we could associate each of these physical inputs with a Source Profile. The type of source (CR mic, Guest mic, codec, phone, etc) determined parameters such as monitor muting and backfeeds.

When each Source Profile is configured, you have a choice for the Source Input. If you select one of the rear panel connectors, the console source is associated with that input. If you select **Livewire**, you are telling the iQ that this source is not associated with a local input but is, instead, a source from elsewhere on your Livewire network. You may then assign that **Primary Source** by using the Browse button to choose from a list of Livewire sources. That's all there is to it!

Figure 7-1 shows an example of a codec source that's been configured as a Livewire Source Input with a network Primary Source. In this example, the Livewire **Channel Number** of that source is 1037 and it is coming from an Axia node named AES-103. The source has a designation of CODEC_1 on that node. Everything else in the configuration of the Source Profile is exactly the same as if that codec was connected directly to the QOR.32.

In summary, your iQ console sources inputs may be configured from any of the rear panel connectors (4 x microphone, 16 stereo analog, 2 x AES) or from as many as 12 incoming Livewire network sources for a total of up to 34 sources. These network sources may be redefined at any time, facilitating a highly flexible system!

Outputs

The Output configuration of your iQ has two sections: one for **Local Outputs** (rear panel connectors) and one for **Livewire Outputs**. As you might expect, the Local Outputs are usually configured for feeds to in-studio devices like CR Monitors, headphone amplifiers, etc.

The **Livewire Outputs** consist of four streams from your iQ that you wish to deliver to your Livewire network. These four streams will be available to other devices and users on your network.

The following parameters are configured for each of the four Livewire Outputs:

- **Output**: Specifies the audio feed to be delivered to the network on each of the four Livewire channels. Selections include:

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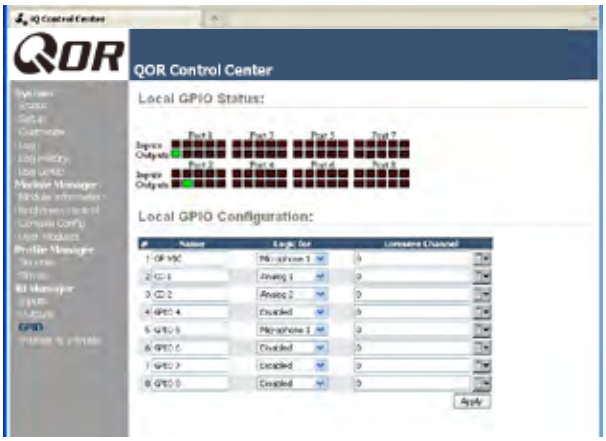

Figure 7-3: GPIO

» Any of the local inputs: 4 microphone, 16 stereo line or 2 digital AES inputs.
» Any internal generated iQ sources including **PGM-1, 2, 3** or **4**, **Record**, **CR Monitor**, **CR Headphones**, **Preview**, **Talk to CR**, **Talk to External**, **Studio Guest HP**, **Studio Monitor**, **Studio Talent HP**, and **Auto Backfeed**.
» **VMix** or **VMode** outputs.

- **Name Override**: Allows you to specify a name (16 characters maximum) that will describe this iQ source to network users. This field will override the source name specified in the local Source Profile.
- **Channel**: The Livewire channel designation. Specify a unique channel number between 1 and 32,767 that will be used by the Livewire network to identify your iQ's network audio.
- **Mode**: Enables and chooses the stream priority for this channel. Options are:
  » **Disabled** - the channel is off.
  » **Live Stereo -** Choose this when the audio output contains live voices or other high-priority audio.
  » **Standard Stereo** - Choose when the audio output consists of pre-recorded music or programming.

GPIO

The QOR.32 has eight physical GPIO ports presented on DB-15 connectors. Often, these ports are associated with local sources for logic control of devices such as CD players or for external on/off control of your microphones. In these cases, select the local source to which you wish to map the GPIO port by using the **Logic For** drop down box.

Sometimes, however, you may wish to use GPIO logic that is associated with some other Livewire network audio source. In this case, you will select **Livewire** from the **Logic For** drop-down. You may then enter the Livewire channel number directly or by using the **Livewire** button on the right side of the screen. When you click on this button, a pop-up prompts you to select a Livewire channel from your network; the GPIO port will then become the logic interface for that Livewire source.

Networking

To deploy iQ in a network setting, you will interconnect the Ethernet switch built into your QOR.32 with other QOR.32s, or to external Ethernet switches.

The QOR has a zero-configuration, built-for-broadcast network switch. It does not require any configuration in order to connect it with other Livewire studios. If you're connecting it to another QOR in "daisy-chain" mode, simply use CAT-6 Ethernet cable to connect one of the Gigabit ports to a Gigabit port on the other QOR. If you're connecting it to a larger network's core switch, connect one of the Gigabit QOR ports to a properly configured and approved Core switch.

As a point of clarification, the QOR's Ethernet switch differs from an off-the-shelf network "core" switch in the following ways: The Ethernet switch in a QOR.32 is always at the "edge" of a large Livewire network. In IT parlance, this type of switch is actually referred to as an "edge" switch.

IT Note: If your system employs an Ethernet core switch, the Ethernet core switch must have an IP address numerically lower than any of your iQ units or Ethernet edge switches. This function of the IGMP standard ensures that the multicast querier is handled by the core switch if one exists. The querier function will be passed off transparently to another switch should the core switch fail or be disconnected.

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Mimicking nature,

streams combine to form anew

many become one.

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Appendix A:

iQ Specifications

Microphone Preamplifiers
Source Impedance: 150 ohms
Input Impedance: 4 k ohms minimum, balanced
Nominal Level Range: Adjustable, -75 dBu to -20 dBu
Input Headroom: >20 dB above nominal input
Output Level: +4 dBu, nominal

Analog Line Inputs
Input Impedance: 20 k Ohms
Nominal Level Range: Selectable, +4 dBu or -10dBv
Input Headroom: 20 dB above nominal input

Analog Line Outputs
Output Source Impedance: <50 ohms balanced
Output Load Impedance: 600 ohms, minimum
Nominal Output Level: +4 dBu
Maximum Output Level: +24 dBu

Digital Audio Inputs and Outputs
Reference Level: +4 dBu (-20 dB FSD)
Impedance: 110 Ohm, balanced (XLR)
Signal Format: AES-3 (AES/EBU)
AES-3 Input Compliance: 24-bit with selectable sample rate conversion, 20 kHz to 216kHz input sample rate capable.
AES-3 Output Compliance: 24-bit
Digital Reference: Internal (network timebase) or external reference 48 kHz, +/- 2 ppm
Internal Sampling Rate: 48 kHz
Output Sample Rate: 48 kHz
A/D Conversions: 24-bit, Delta-Sigma, 256x oversampling
D/A Conversions: 24-bit, Delta-Sigma, 256x oversampling
Latency <3 ms, mic in to monitor out, including network and processor loop

Frequency Response
Any input to any output: +0.5 / -0.5 dB, 20 Hz to 20 kHz

Dynamic Range
Analog Input to Analog Output: 102 dB referenced to 0 dBFS, 105 dB "A" weighted to 0 dBFS
Analog Input to Digital Output: 105 dB referenced to 0 dBFS
Digital Input to Analog Output: 103 dB referenced to 0 dBFS, 106 dB "A" weighted
Digital Input to Digital Output: 125 dB

Equivalent Input Noise
Microphone Preamp: -128 dBu, 150 ohm source, reference -50 dBu input level

Total Harmonic Distortion + Noise
Mic Pre Input to Analog Line Output: <0.005%, 1 kHz, -38 dBu input, +18 dBu output
Analog Input to Analog Output: <0.008%, 1 kHz, +18 dBu input, +18 dBu output
Digital Input to Digital Output: <0.0003%, 1 kHz, -20 dBFS
Digital Input to Analog Output: <0.005%, 1 kHz, -6 dBFS input, +18 dBu output

Crosstalk Isolation, Stereo Separation and CMRR
Analog Line channel to channel isolation: 90 dB isolation minimum, 20 Hz to 20 kHz
Microphone channel to channel isolation: 80 dB isolation minimum, 20 Hz to 20 kHz
Analog Line Stereo separation: 85 dB isolation minimum, 20Hz to 20 kHz
Analog Line Input CMRR: >50 dB, 20 Hz to 20 kHz
Microphone Input CMRR: >50 dB, 20 Hz to 20 kHz

Audio Processing
Mic Equalizer (applicable to up to 6 faders)
Frequency Bands: 20Hz to 320Hz, 125Hz to 2KHz, 1.25KHz to 20KHz.
Cut/Boost range on each band: -25dB to +15dB.
Q-factor: Automatic - bandwidth varies based on amount of cut or boost.

Power Supply AC Input, QOR.32 with iQ Console
Auto-sensing supply, 90VAC to 240VAC, 50 Hz to 60 Hz, IEC receptacle, internal fuse
Power consumption: 100 Watts

Operating Temperatures
-10 degrees C to +40 degrees C, <90% humidity, no condensation

Dimensions (HxWxD) and Weight
QOR.32: 7 x 19 x 15 inches (4RU), 15 pounds
See the figures that follow for detailed dimensions of iQ frames.

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Table of Inputs and Outputs

Main Outputs	Type	Comments
Program 1	Stereo	Main stereo bus (Usually referred to as Program)
Program 2	Stereo	Second stereo bus (Sometimes referred to as Audition)
Program 3	Stereo	Third stereo bus (Sometimes referred to as Utility)
Program 4	Stereo	Fourth stereo bus (Sometimes referred to as Auxiliary)
Program 4 Record	Stereo	Fourth stereo bus variation (post fader, pre on/off)
Program 4 Phone (internal bus only)	Stereo	Fourth stereo bus variation (pre fader, pre on/off)
V-Mixer	Stereo	Stereo Submix - sum of five stereo sources
V-Mode	Stereo	Used for processing MONO sources and creation of MONO streams

Monitor-related Outputs	Type	Comments
CR Monitor	Stereo	Control room monitor speakers, source and level controlled by Monitor 1 control
CR Headphone	Stereo	Control room (board op) headphone, source and level controlled by headphone control
Studio Monitor	Stereo	Studio monitor speakers, source and level controlled by Studio Monitor control
Studio Headphone Talent	Stereo	Studio (talent) headphones, source same as main, fixed level output, with talkback
Studio Headphone Guest	Stereo	Studio (guest) headphones, source same as main, fixed level output, no talkback
Preview	Stereo	Allows the connection and level control of external powered speakers.
Talk to External	Mono	Allows board operator mic to talk to other devices, a logic command is associated
Talk to CR Audio	Mono	Allows the Talk to CR audio mix to drive an external destination

Monitor-related Inputs	Type	Comments
External Preview Input	Stereo	Allows an external path into the preview speakers, a logic command is associated
External Monitor Input 1	Stereo	Allows an external source to be monitored by CR or studio selectors
External Monitor Input 2	Stereo	Allows an external source to be monitored by CR or studio selectors

Source Inputs	Type	Comments
Microphone Input *n*	Mono	Typical installations have 2 microphone sources per studio
Analog Line Input *n*	Stereo	Typical installations have 4-8 analog line sources per studio
Digital Line Input *n*	Stereo	Typical installations have 2-4 digital line sources per studio

Source-related Outputs	Type	Comments
Feed-to-Source A *n*	Mono	Mono mix-minus output feeds the left side of a stereo connection. “Talk to...” function enabled.
Feed-to-Source B *n*	Mono	Mono mix-minus output feeds the right side of a stereo connection. “Talk to...” function disabled.

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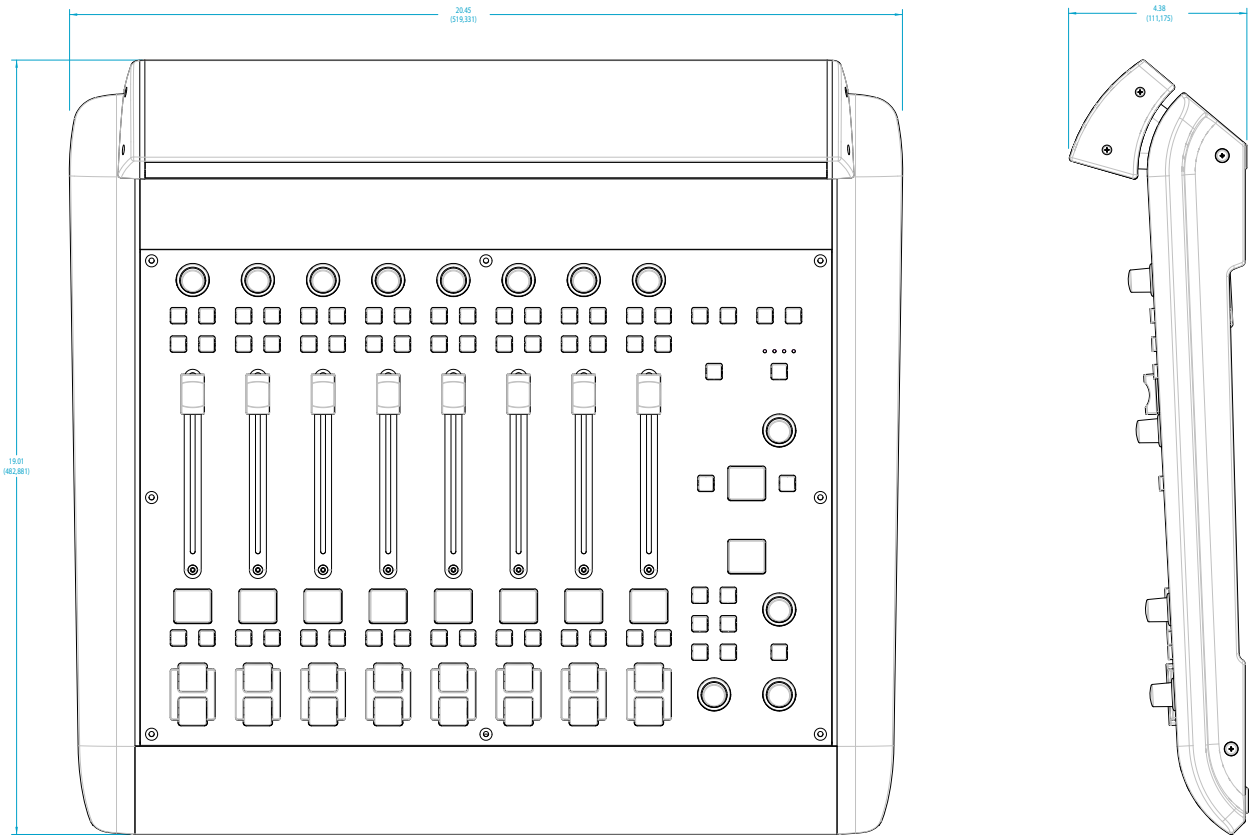
iQ Main Frame (8 faders + monitor controls)



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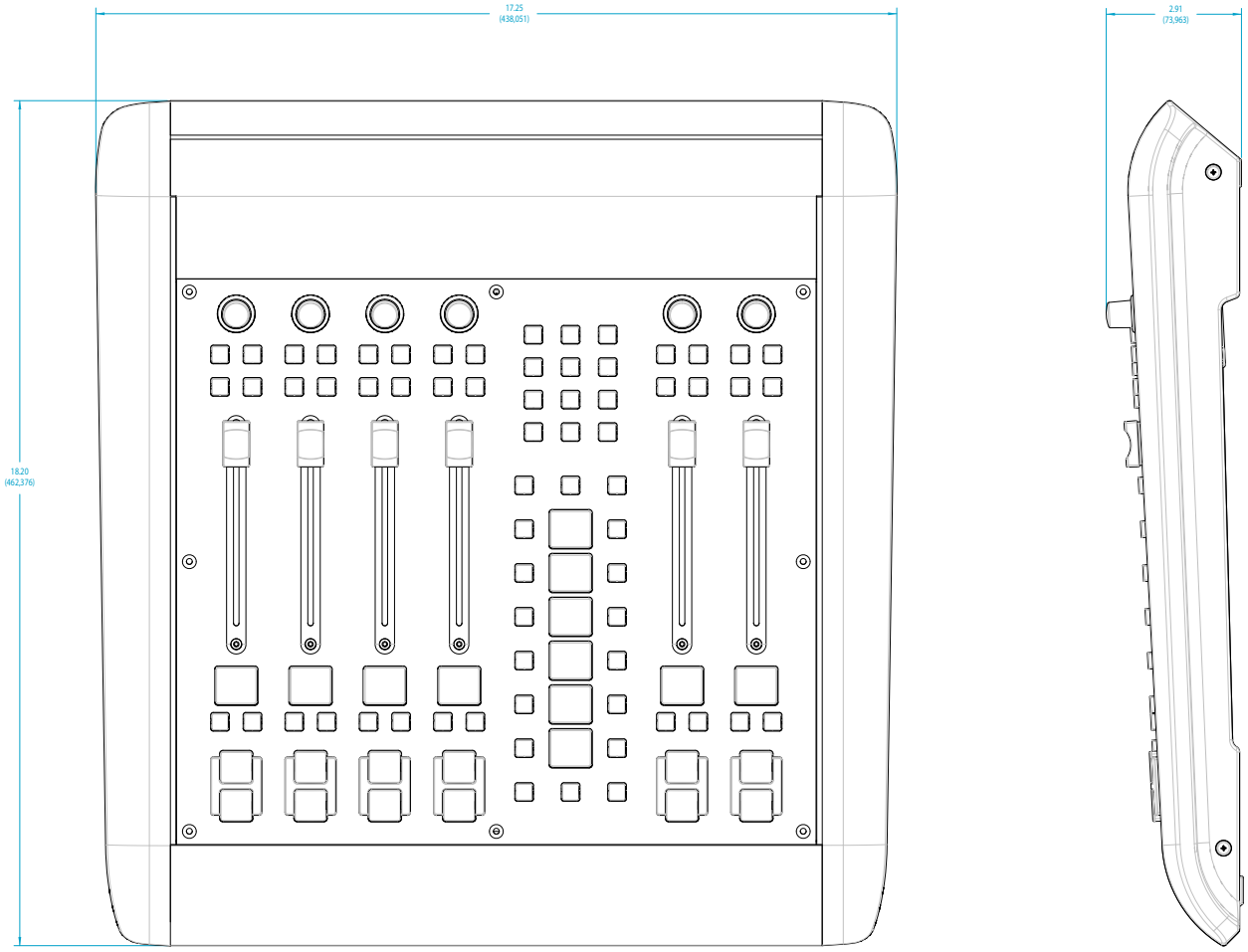
iQ Telco expansion frame (6 faders + call controller)



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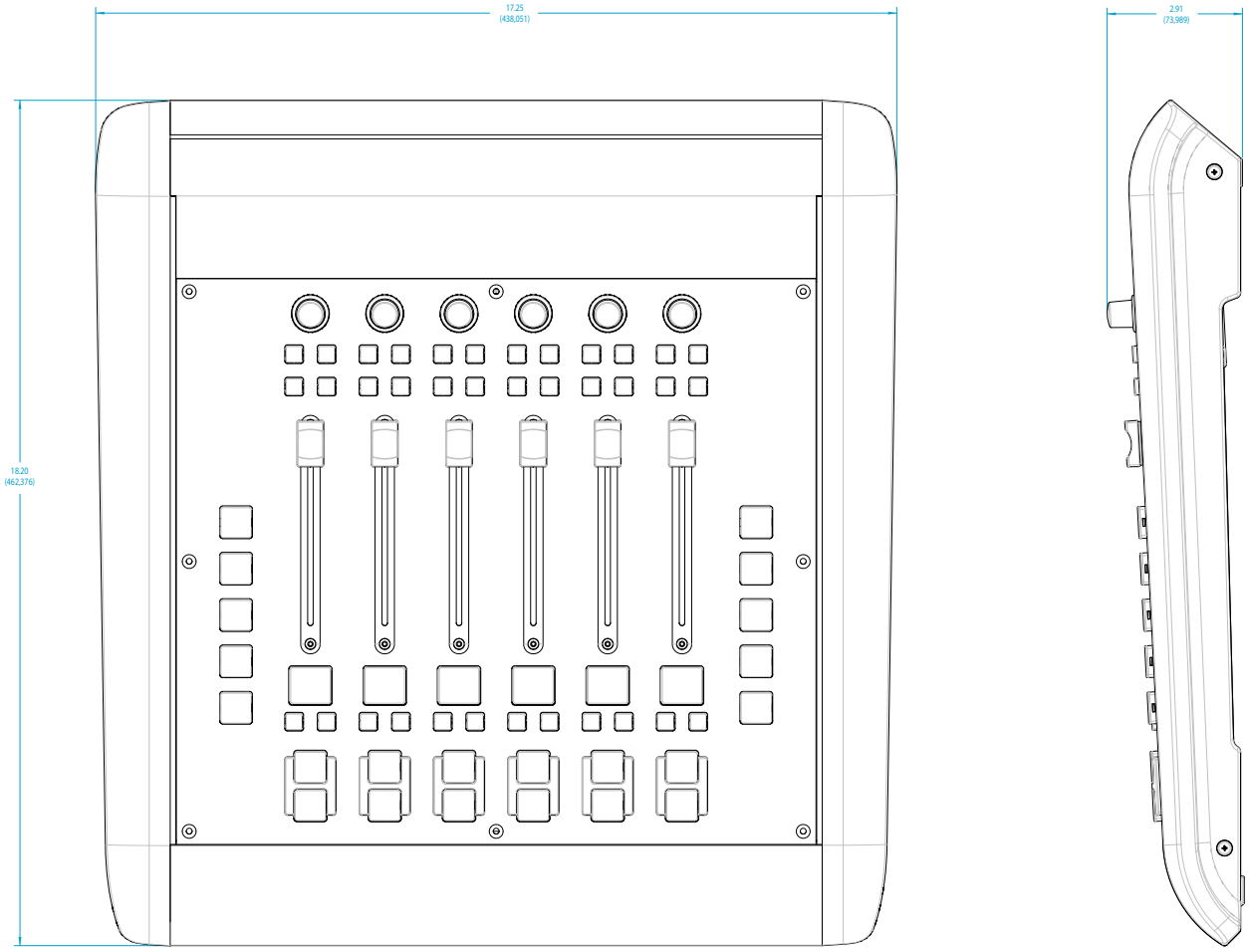
iQ button expansion frame (6 faders + programmable keys)



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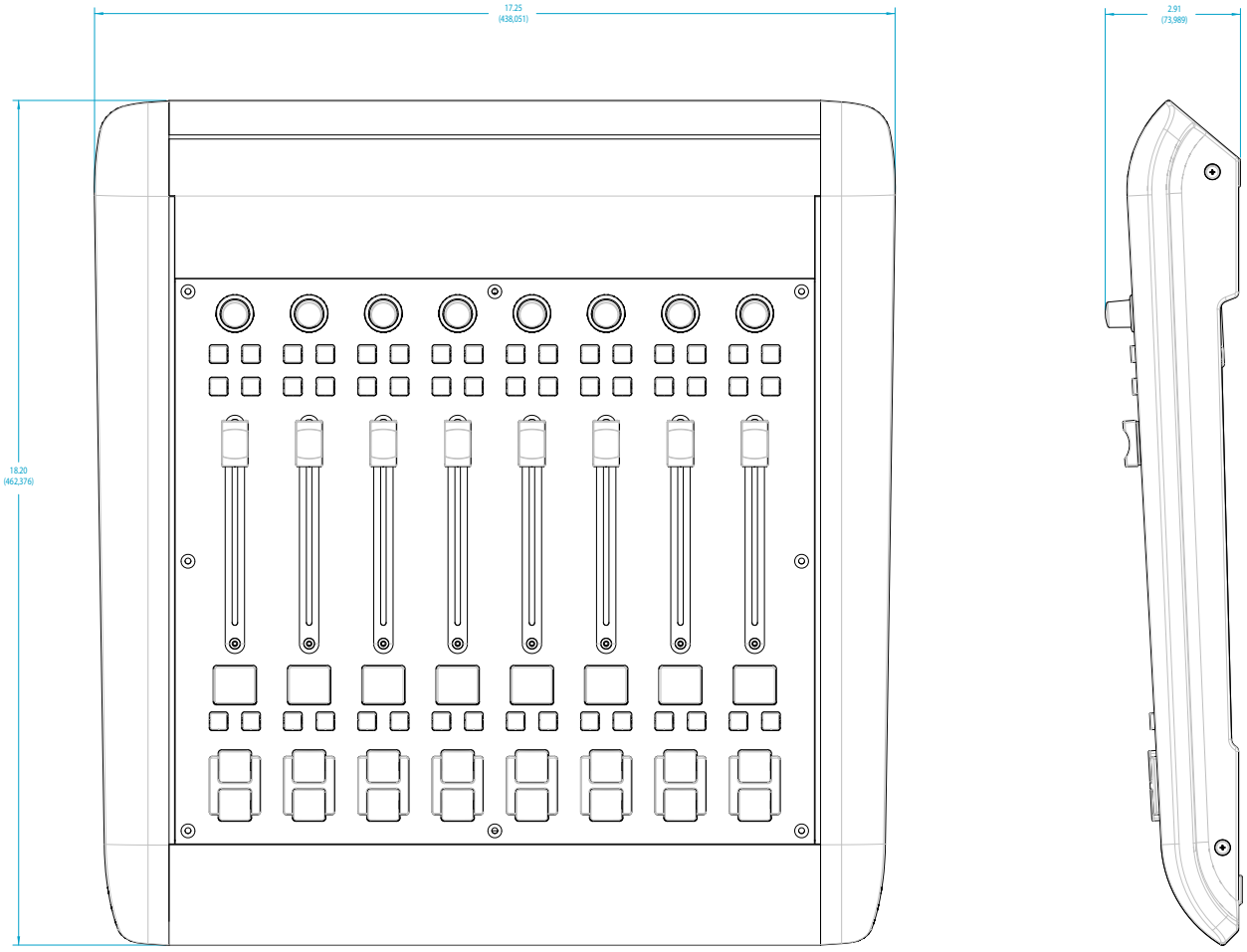
iQ 8-Fader expansion frame



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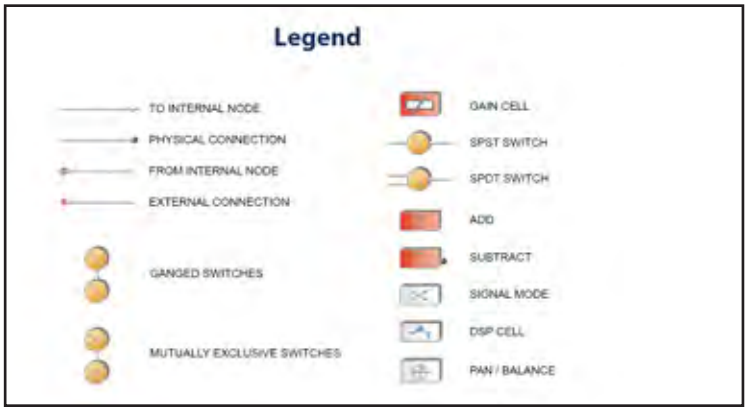
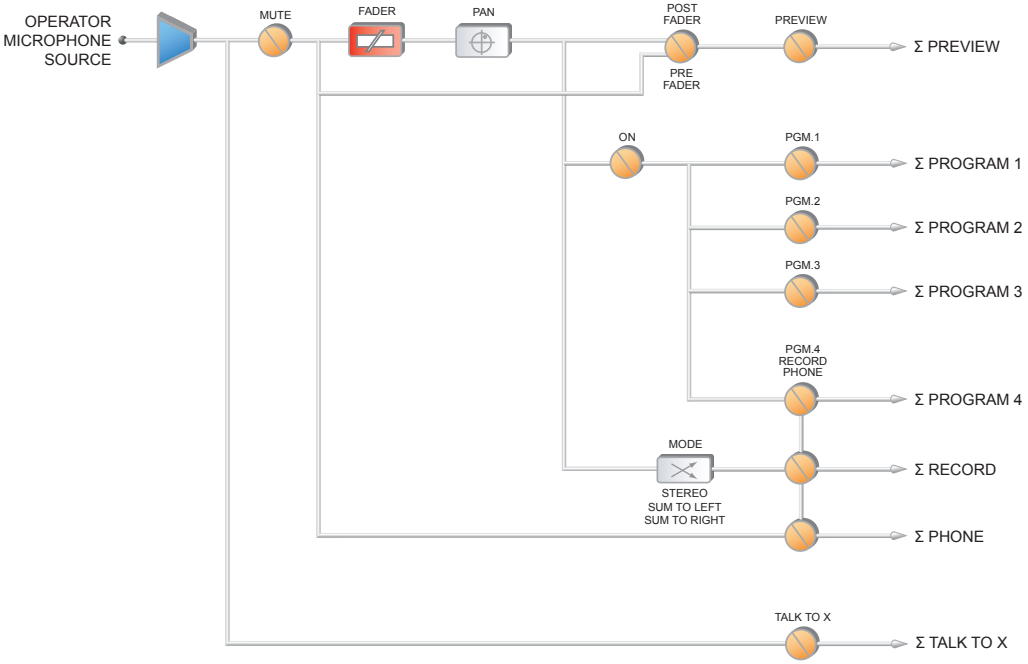
Appendix B: iQ Block Diagrams





Revised: January 2010

Figure B-1 Block Diagram - Operator Microphone

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iQ Block Diagrams

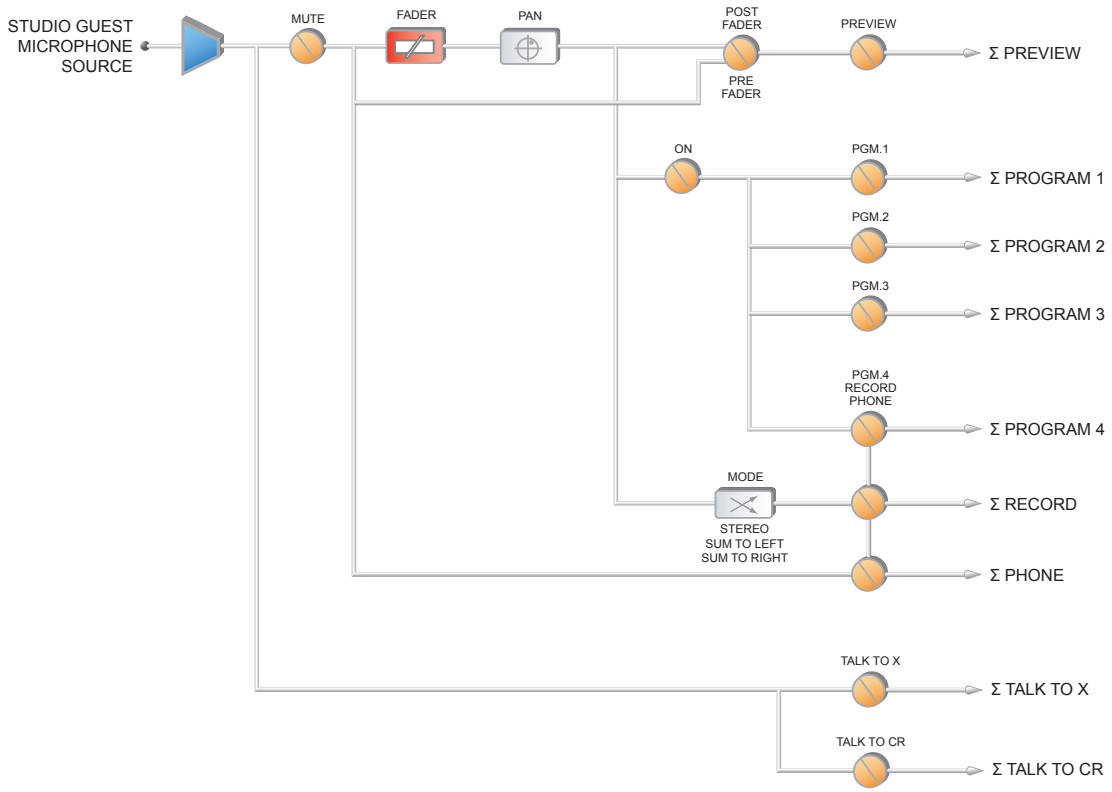

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Figure B-2 Block Diagram - Guest Microphone

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iQ Block Diagrams

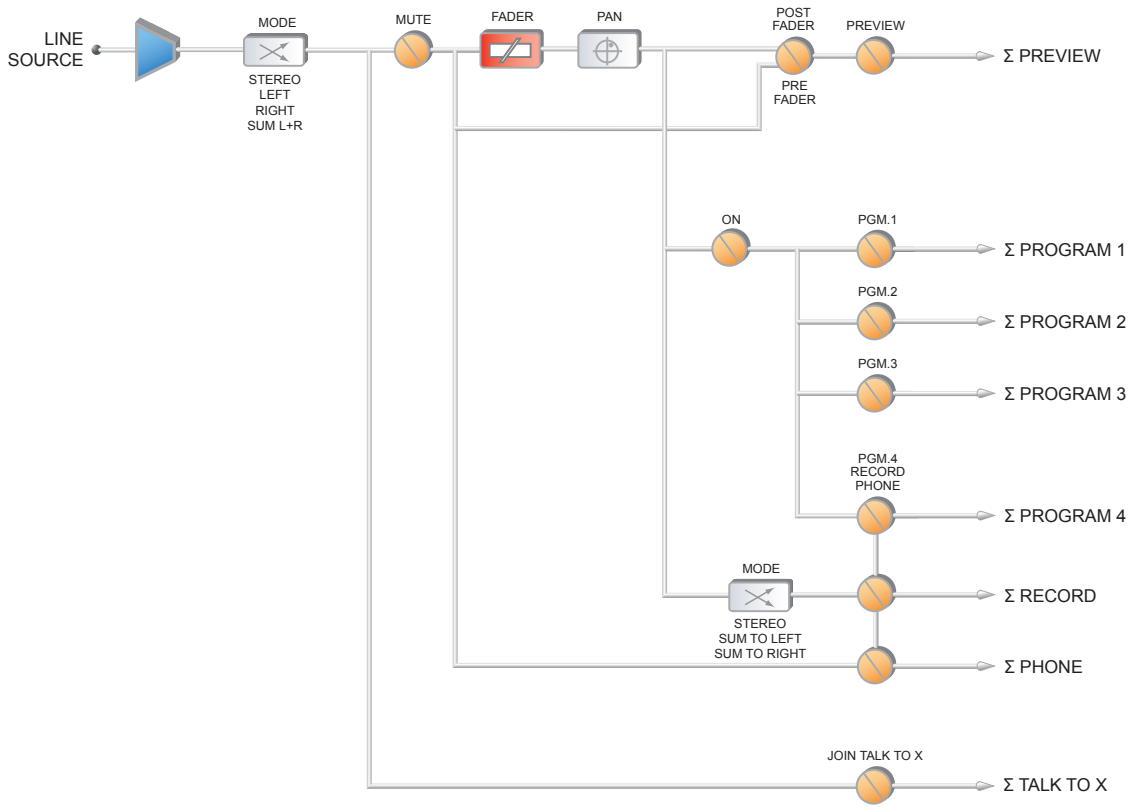

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Figure B-3 Block Diagram - Line Source

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iQ Block Diagrams

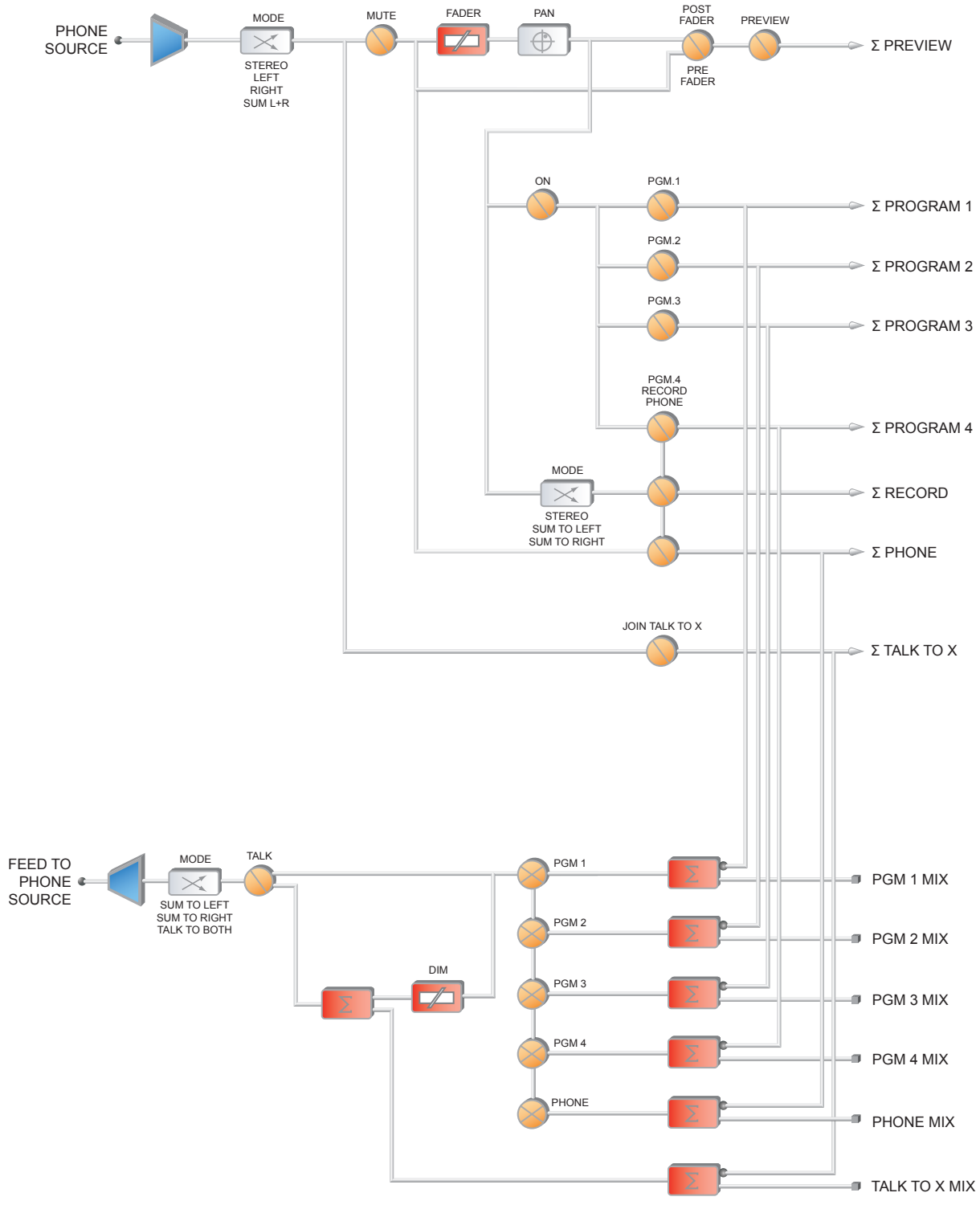

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Figure B-4 Block Diagram - Phone Source

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iQ Block Diagrams

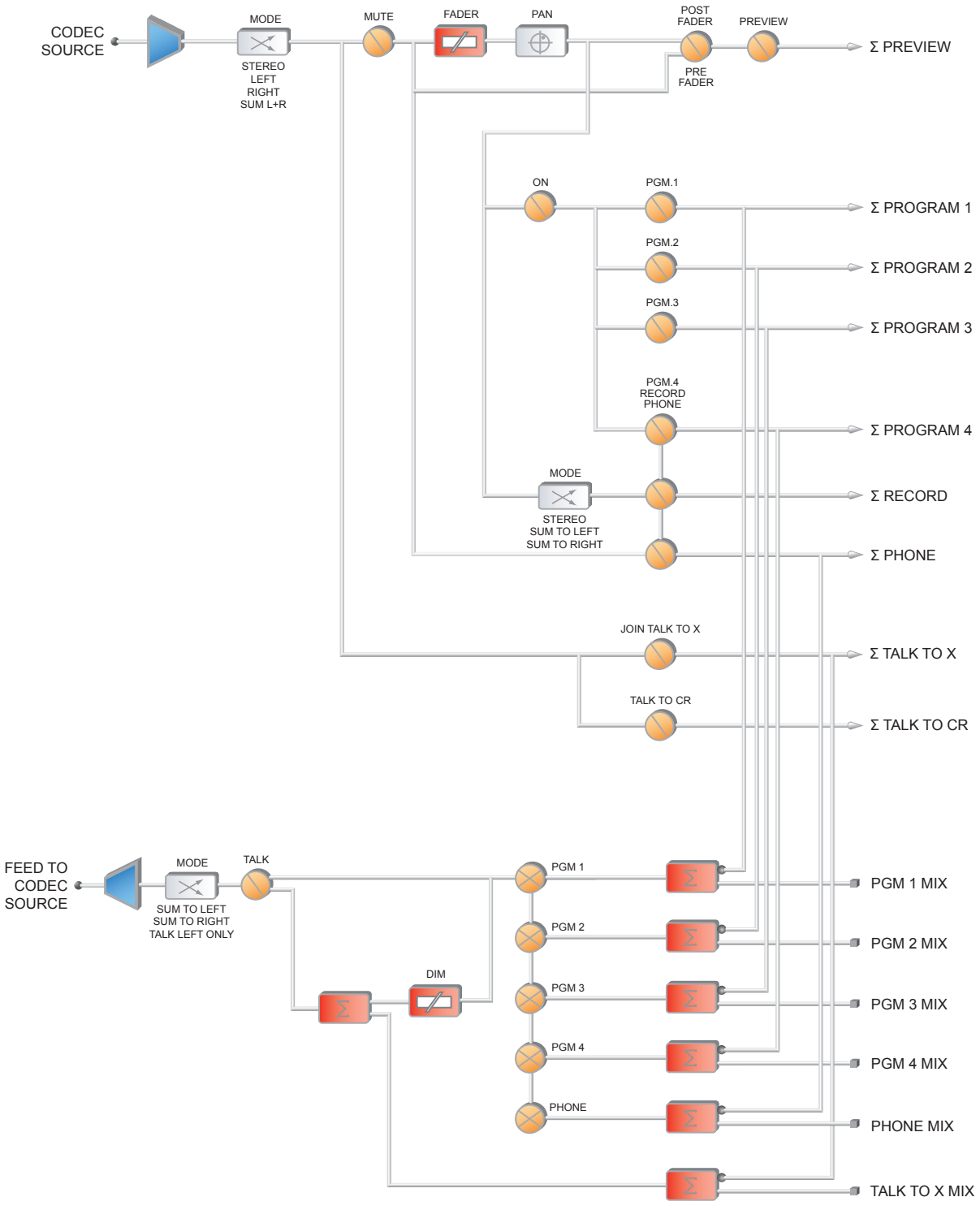

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Figure B-5 Block Diagram - Codec Source

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iQ Block Diagrams

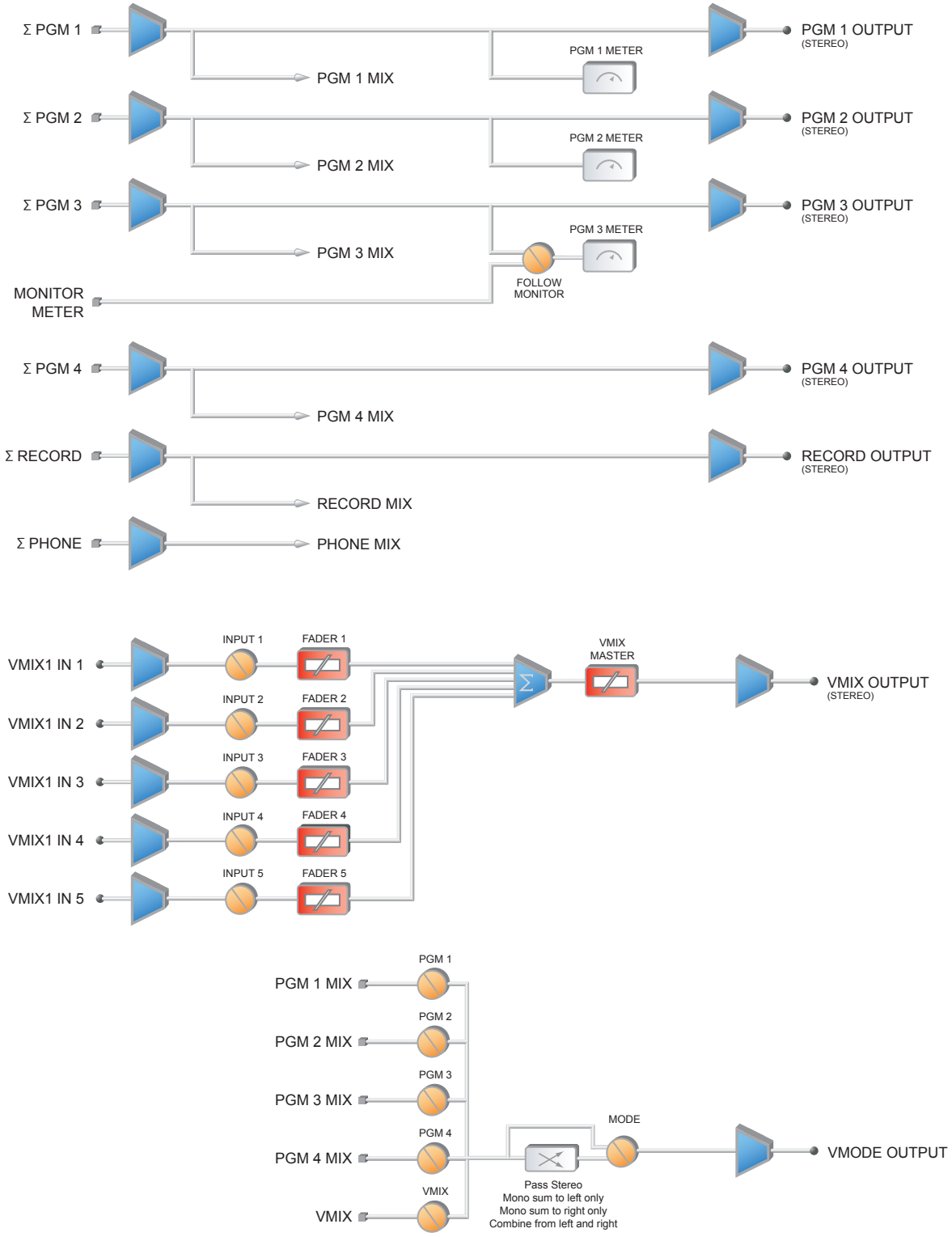

Figure B-6 Block Diagram - Master Output

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iQ Block Diagrams

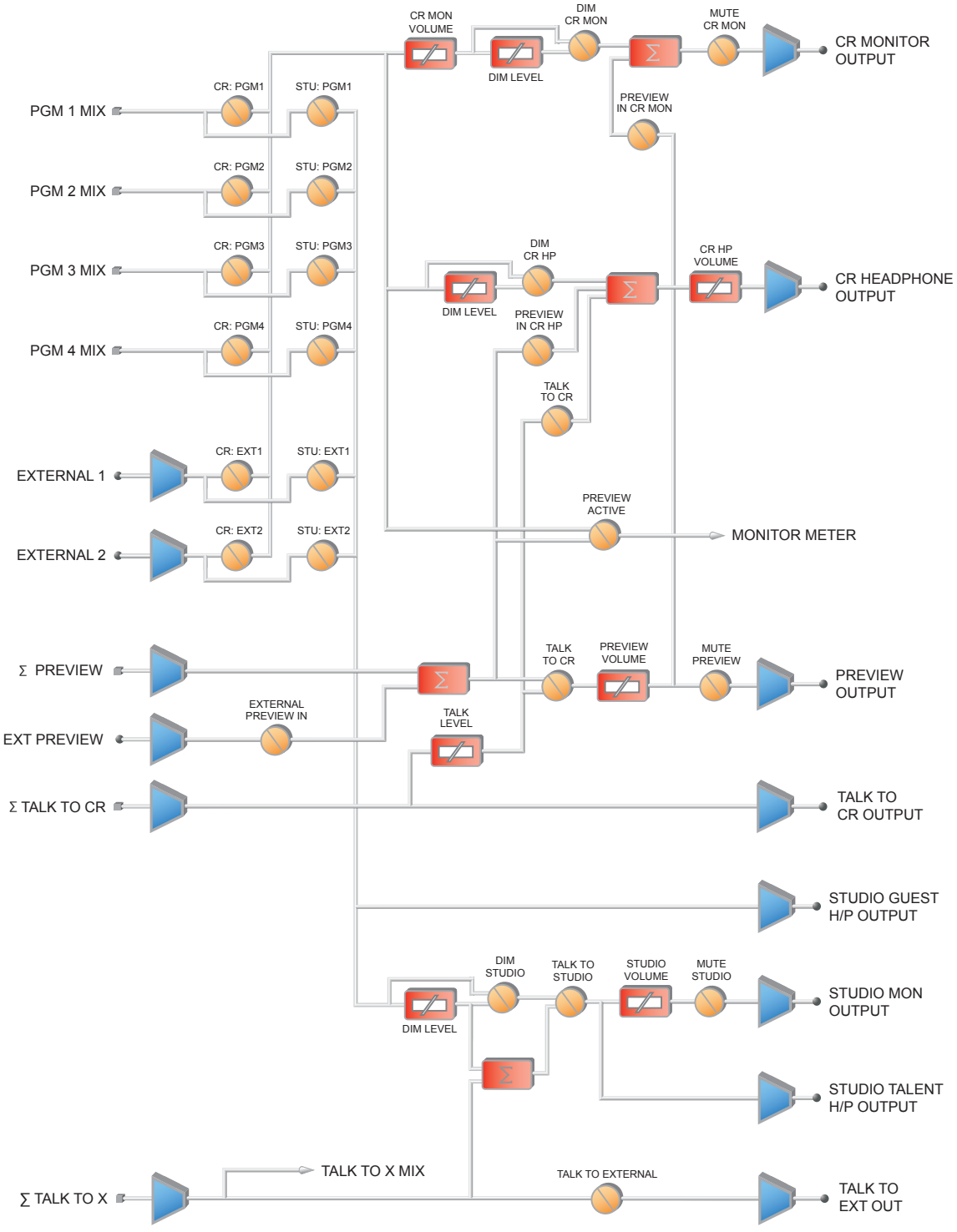

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Figure B-7 Block Diagram - Monitor Output

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The cup steams, sweet scent

wafting lightly in the air.

Mmmmm... it is Earl Grey.

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Appendix C: Channel / IP Worksheets

The scalable nature of Axia Livewire audio networks makes it possible to construct systems of any size - from a single room to an entire multi-studio facility.

Since Livewire components – Audio Nodes, Elements, StudioEngines, PowerStation, iQ, etc. – are connected with Ethernet, each one requires a unique IP (Internet Protocol) address. IP addresses are four bytes long and are written in "dotted decimal" form, with each byte represented decimally and separated by a period. For example, in the IP address 193.32.216.9, the 193 is the value for the first byte, 32 for the second, etc. Since a byte can hold values from 0 to 255, this is the range for each decimal value. If you run a public network, Host IP addresses are assigned to your organization by your internet service provider and parceled out to individual host computers by your network administrator. He may give you this number to be entered manually, or could opt for DHCP (Dynamic Host Configuration Protocol) to let your computer get the address automatically from a pool. Because Livewire devices are permanently attached and because it is more desirable to know the IP address attached to a particular node (and perhaps assign them in some kind of logical pattern), we do not support DHCP for our hardware nodes. Therefore, you will need to enter an IP address into each node.

Livewire systems can support over 10,000 channels of audio; this necessitates giving each audio source or destination its own unique identifier, called *Channel ID numbers.*

As you can imagine, keeping track of so many unique IP addresses and Channel ID numbers is a big job. Therefore, on the next few pages, we've provided you with worksheets that you can use to keep track of the numbers you've assigned.

A logical convention that is often followed will link the Livewire channel number to the last octet of the device IP address. For example, if a node has an IP address of 192.168.1.12, the channel numbers assigned to the 8 sources of that node might be 1201 through 1208.

For a more detailed explanation of IP addresses, subnet masks and related issues, we highly suggest that you refer to "Network Engineering For Audio Engineers", Chapter 8 of our *Introduction to Livewire: IP Audio System Design Reference and Primer.*

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Axia IP Address Assignment Worksheet

IP Address	*Device Name*	*Location*	*Notes*
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Axia Audio Channel Assignment Worksheet - SOURCES

Channel ID Number	*Device Name*	*Device Location*	*Notes*

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Axia Audio Channel Assignment Worksheet - DESTINATIONS

Channel ID Number	*Device Name*	*Device Location*	*Notes*

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Warranty

Axia Audio Limited Warranty

This Warranty covers “the Products,” which are defined as the various audio equipment, parts, software and accessories manufactured, sold and/or distributed by TLS Corp., d/b/a Axia Audio (hereinafter “Axia Audio”).

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This warranty is void if the Product is subject to Acts of God, including (without limitation) lightning; improper installation or misuse, including (without limitation) the failure to use telephone and power line surge protection devices; accident; neglect or damage.

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Axia Audio at its option will either repair or replace the Product and such action shall be the full extent of Axia Audio’s obligation under this Warranty. After the Product is repaired or replaced, Axia Audio will return it to the party that sent the Product and Axia Audio will pay for the cost of shipping.

Axia Audio’s authorized dealers are not authorized to assume for Axia Audio any additional obligations or liabilities in connection with the dealers’ sale of the Products.

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